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ELECTRIC RAILWAY JOURNAL

Consolidation of Street Railway Journal and Electric Railway Review
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Dallas and Its Railway Reach a Settlement

DALLAS has done the sensible thing. The city and the local railway have settled in conference a controversy that at one time threatened to reach the courts. As a result of this amicable adjustment the Dallas Railway is to be permitted to continue to charge a 6-cent fare for another year and in return agrees to spend approximately $500,000 on a program of improvements. Both sides to the controversy gave ground. Each expressed confidence in the other. Each had respect for the motives that prompted the other in the stand which it took. Honest differences of opinion have arisen before in Dallas between the railway and the city, but in every case a way out has been found that has left no feeling of remorse on either side. That there is an unusual degree of respect for each other between the parties at Dallas is reflected in the statement of the local company that "we rely upon the sense of fairness and justice of the Board of Commissioners again to extend the said 6-cent fare if conditions twelve months from now warrant such extension."

It is generally agreed that credit for hitting upon the terms of the present settlement basis is due to Supervisor of Public Utilities J. W. Everman. His part in the negotiations certainly was a large one and his efforts bespeak for him a real understanding of the functions of the post which he so creditably fills. All in all, the settlement there is certainly a most propitious arrangement for all concerned.

Accident Reduction Should Appeal to the Men Higher Up

THE safety movement is one worthy of the most enlightened interest of electric railway managers. They have in the past, however, left the matter largely to their claims departments, accepting the conclusion that some loss of life and a greater maiming of employees and the general public form a necessary accompaniment of the transportation business. Their attitude was in part justified by the willful risks taken by Mr. Average Citizen, who nullifies many of the best-intentioned efforts to safeguard him from injury. However, the managerial attitude is changing rapidly now.

Probably the most cogent reason for the improved status of the safety movement in the electric railway field is the demonstration that accidents can be prevented. "No-accident weeks" tell their own story. Another powerful stimulus to interest is furnished by the tremendous cost of accidents in many localities. Increasing vehicular and pedestrian congestion, combined with recklessness, cut into the net income seriously. So with the growing conviction that accidents can be prevented comes the growing necessity for preventing them. This situation will be clearly portrayed in a group of articles in next week's issue of this paper.

One thing that, more than anything else, will help the safety movement in the electric railway field is that it be taken seriously. Too often it is looked upon as a "hot air proposition" and given only scant encouragement. The manufacturing industries are in the lead here, due in part to the fact that they deal almost altogether with employees, while in the case of the electric railway public accident hazards prevail. At the same time the electric railway has more to gain from effective safety work because the risk is greater. Money saving, improvement in public good will and reduced interference with operation are only three of many desirable results in this field.

What Is the Present Status of Rail Standardization?

THE Cleveland Railway has a new T-rail section of its own and the Market Street Railway (San Francisco) is branching out with a new girder grooved rail. What, if anything, is the matter with the association standard sections, that these important properties have to go outside the list for their recent construction? This is a question which will arise spontaneously in the mind of every engineer who is desirous of securing the savings that standardization will ultimately bring.

It is obvious that the engineers of the two properties mentioned did not decide to incur the extra expense of having special sections rolled without carefully weighing the merits of existing standards. They decided that the special sections were worth the extra money. They wanted to be able to express their engineering convictions in cold steel and were willing to pay the price. No one can blame them, and at the same time there is no reflection on the standards. Why? Because on the one hand if an engineer has a good idea he ought to be allowed to try it out if he can get the money. On the other hand, the standards represent the best average practice and tendencies and are offered to the industry for what they are worth. Most railways can save money and trouble by using them. They cannot cover all conditions and merit the approval of all individuals. Their use cannot be enforced by law, nor will loyalty to an association outweigh engineering considerations. Hence failure to use them in particular cases simply means that the appeal of the local problem prevailed.

These generalizations suggest a little specific calculation. How much extra does a special rail section cost? Of course this depends on the quantity rolled and the terms of purchase agreed upon. The most satisfactory plan to follow, when a railway wants a new section rolled, is for the railway to put up the money for the rolls, the amount to be rebated eventually if the section proves popular. Thus, assume for purpose of calculation that a set of rolls for a T-rail section costs $6,000. If other railways desiring to use these rolls will pay a premium of a dollar a ton for their rails the cost would be recouped in a short time if the section made a hit.

This would involve the rails for less than thirty-five miles of single track, assuming a 100-lb. rail. Thus, the industry would pay 2.5 per cent extra for this rail for a limited time, after which the price would fall to the market value. A dollar a ton appears to be a reasonable premium. Obviously it would not pay to design a special section for a few hundred tons of rail, but if the immediate and prospective demand is such as to amortize the extra cost without excessive premium one can understand the occasional ordering of new designs by large companies.

At the same time standardization should be fostered by the industry to a much greater extent than it is. All companies, and particularly the smaller ones, will profit by it. This paper has been a consistent advocate of the movement for many years. It takes a skeptical attitude toward an apparent need for new designs when there are old and tried ones in the field. But standards, like everything else, are subject to improvement. So along with standardization must go experimentation. The engineering and economic problem is to strike a proper balance between the two. But it should be clear that there is a real need for any new rails, or other non-standard products, before new ones are adopted. If possible any proposals for new designs should first be discussed with organizations responsible for the strong efforts at standardization which are now being made. The present tendency is toward lessening varieties of manufactured products as much as possible.

Reserve Bank Shows Stability of Electric Railway Business

VARIOUS measures for determining the trend of business activity in a community have been suggested. They include activity in the building industry, extent of bank loans, bank clearances and real estate sales, number of telephone calls, amount of post office receipts, the trend of raw material prices, and street railway traffic. In the monthly review for June of the Federal Reserve Bank of Boston considerable space is given to the discussion of the use of street railway traffic statistics for such a purpose, and while it is admitted that there is no exact measure for business activity, the opinion is expressed that street railway figures afford a good guide. For this purpose a composite chart of nine Massachusetts companies has been prepared and adjusted for seasonal variations, because of the larger business always done by these companies in summer over that in winter. According to the Reserve Bank the fluctuations as shown in this chart correspond closely to the general trend in business as shown by other indices for the years under consideration.

The chart also proves an interesting point not mentioned in the bank comment. This is that while the line of street railway traffic may follow the general trend of other business conditions, it does not swing so far in each direction, and consequently as an investment it is much more to be desired by those who want steady, continuous performance rather than wide fluctuations.

For example, in the chart, after being adjusted for seasonal changes, the greatest rise between January, 1919, and May, 1922, over the 1921 average seems to be in about September, 1920, when the increase was about 14 per cent, and the depth was reached at about 85 per cent in August, 1921. This is a maximum swing of about 34 per cent based on the lower number.

Here are the figures of all of the other manufacturing and financial charts, on the same basis and for the same years, as checked roughly from the diagrams given in the same report:

Manufacturing activity in New England[a]	67% to 105% or 57%
Brokers' commercial paper	3.5% to 7.8% or 123%
Rediscount rate of Federal Reserve Bank of Boston	4% to 7% or 75%
Woolen manufacturing activity in New England[a]	32% to 120% or 275%
Cotton manufacturing activity in New England[a]	44% to 107% or 143%
Shoe manufacturing activity in New England[b]	46% to 140% or 204%
Paper production in United States	380,000 tons to 650,000 tons or 71%
Construction in New England[c]	33% to 118% or 257%
Net sales of eight department stores in Boston[d]	80% to 215% or 169%
Net sales of eighteen department stores in New England outside of Boston[d]	88% to 225% or 156%
Exports of boots and shoes	40,000 pairs to 230,000 pairs or 475%

(a) A basis of average rate, year ended June 30, 1920; (b) on basis of 1920; (c) on basis of 1913; (d) from January, 1921, to May, 1922, basis of first half of 1919.

All of these figures are approximated from the chart and not from tables, but they show that every industry quoted has a much wider swing than the electric railway industry.

As explained, this is an important feature from an investment point of view. It is also desirable from the standpoint of the employee, as he is not so liable to be thrown out of service on account of lack of work as he would be if the swing were wider.

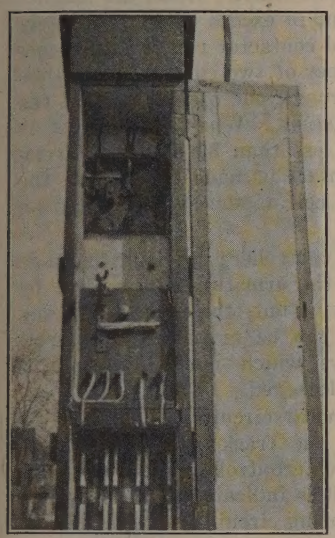
Des Moines Decision Only an Annoyance

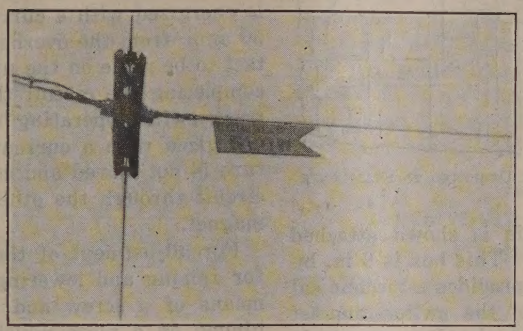
OPPONENTS of the settlement franchise in Des Moines are gloating over their victory before Judge Hume in the Polk County District Court. On their face the counts which that court makes against the franchise grant appear formidable, but they are not so bad as would at first appear. Moreover, the higher courts must pass upon them. Even if it is assumed that the decision of the State Supreme Court should uphold all the contentions of the lower court—an assumption which appears to be most unlikely—the fact remains that the people of Des Moines in their vote on the franchise registered overwhelmingly their desire that the railway controversy be removed from politics and that the company be permitted to operate under conditions that would make it possible for the railway adequately to serve the public. Events since the decision of the lower court was handed down confirm the fact that the decision is not popular with the great bulk of the people. Should it finally materialize that the settlement matter must again go before the public, there is little reason to doubt that the grant will be promptly re-enacted.

The Special Safety Issue of This Paper Will Appear Next Week

Increasing Reliability of Track Switch Operation

During the Past Two Years the Connecticut Company Has Reduced Track Switch Interruptions to an Almost Negligible Element in Operation—This Was Accomplished Through Close Attention to Detail in All Parts of the Electromechanical Apparatus



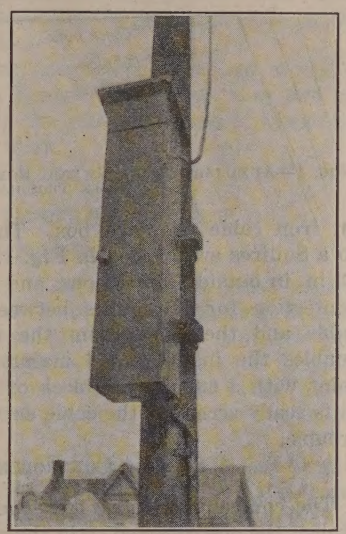


DETAILS OF ELECTRIC TRACK SWITCH CONTROL USED BY CONNECTICUT COMPANY

Left—Pole box containing controller switch and fuse blocks.

Middle — Cheatham contactor and electric track switch slow sign.

Right—Pole box closed.



THE Connecticut Company has in successful operation a large number of track switches on its several divisions, most of these being of Squires or Cheatham make. During 1921 the average number in operation on the Bridgeport division was twenty, on the Hartford division twenty-four, on the New Haven division thirty-three, on the Waterbury division between five and six and on the New Britain division four. The total of these is so large that it has been practicable to give much expert attention to their installation and maintenance. During the past two years, after careful study of causes of interruptions, improvements have been introduced here and there which have greatly reduced such interruptions.

Typical interruption records are reproduced to show how effective this work has been. The reports show that many individual switches operate for long periods without failure of any kind, and many of the failures reported are due to trifling causes.

Taking the reports for a recent month in the winter, when interruptions are most likely to occur, there are found the following typical descriptions of causes of interruptions together with the action taken by the maintainer:

Not throwing power off. Contact point burned off. Renewed same.

Installed one coil slate controller. (This controller is described later in the present article.)

Wishbone stuck. Adjusted same. Impulse contact loose. Tightened same. Installed one coil slate controller.

Impulse lead burnt off at contactor. Installed one coil slate controller.

Leads to magnets burnt off.

Impulse fuse blown.

Feed and ground fuses blown.

Power off. Lead burnt off in pits.

Found flash "short" in off coil of magnet due to its being water-soaked. Will dry out same. Installed new magnet.

Lead "shorted" in conduit. Will have to dig up conduit. Removed magnet and installed new one.

Open coil in magnet. Replaced it.

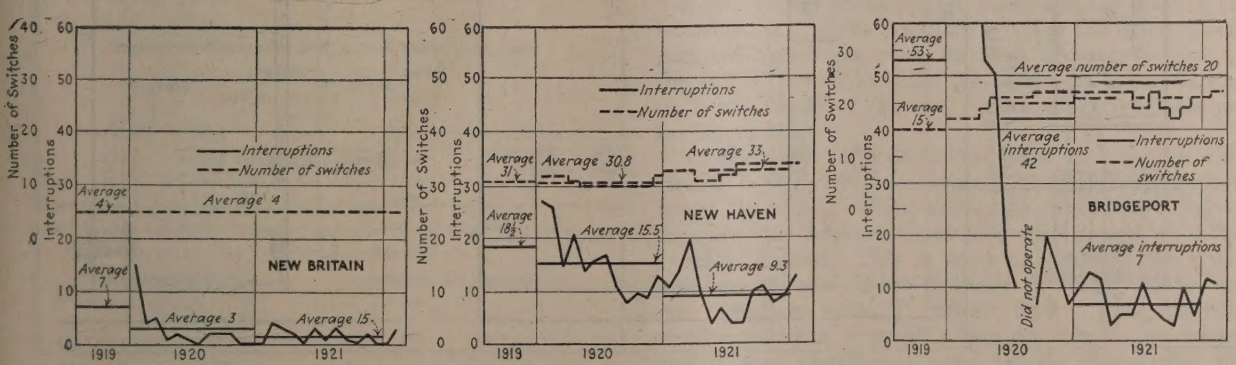
Magnet leads burnt off. Repaired same.

Controller out of adjustment. Adjusted same and switchboard is O. K.

"Magnet" shorted. Installed new magnet and underground cable.

Controller moving element frozen.

One auxiliary to the track switch proper which has been found effective in keeping down cable troubles is



TYPICAL ELECTRIC TRACK SWITCH INTERRUPTION RECORDS

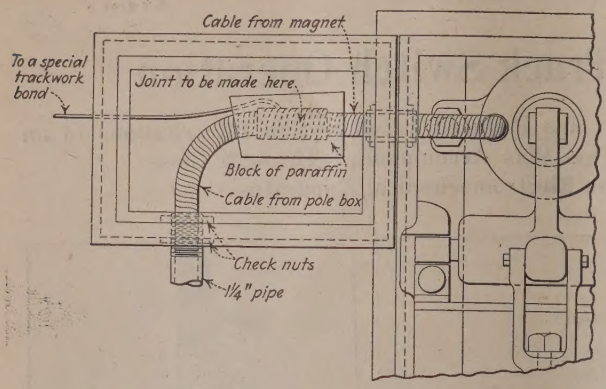


FIG. 1—AUXILIARY TRACK SWITCH BOX DESIGNED TO ELIMINATE CABLE TROUBLES

an iron cable entrance box. This is shown attached to a Squires switch box in Fig. 1. This box is 9 in. by 13 in. in outside dimensions, and provides a mechanical protection for the joints between the switch magnet cable and the cable from the overhead contact. It enables the installer and maintainer to surround the joint with a substantial block of paraffin. It also permits ready access to the cable entry in case of electrical trouble.

A SPECIAL CONTROLLER IS USED

The company has also developed a track switch controller, the one referred to in the report quotations herewith. This is mounted with a switch and fuse blocks in a substantial cabinet on a pole adjacent to the switch.

The features of this controller are shown in Figs. 2, 3 and 4.

In Fig. 2 the controller is shown mounted in the pole box, with a three-pole, double-throw switch above, and a row of three fuse blocks below.

The controller consists simply of a car circuit magnet coil, which when energized attracts a hinged armature carrying on its end a brass contact. When the magnet is energized with a current in excess of approximately 30 amp. from the overhead contactor rail it causes contact to be made on the upper of two contact studs, thus completing the circuit through one of the coils of the track switch operating magnet. When the magnet is energized with a current less than 30 amp. the armature is not moved and contact is made to complete the circuit through the other coil of the switch operating magnet.

For adjustment of the controller, provision is made for raising and lowering the armature hinge pivot by means of a screw and wing-nut, the armature being hinged on a plate which can be moved by the screw when the machine screws which normally clamp it securely in position are loosened.

Fig. 4 shows the electrical circuits connecting the overhead contactor with the track switch operating magnet through the switch, controller and fuses. In the diagram the car circuit is indicated by a heavy line and the track switch operating circuit by a light line.

The feature of this simple controller is its mechanical reliability. The electrical contact which is made between the brass contact piece on the armature and the brass studs has proved to be reliable without platinum or other facing because the current is not broken at this point during a correct operation.

The mechanical details of the controller are given in Fig. 3.

The maintenance of these electric track switches is

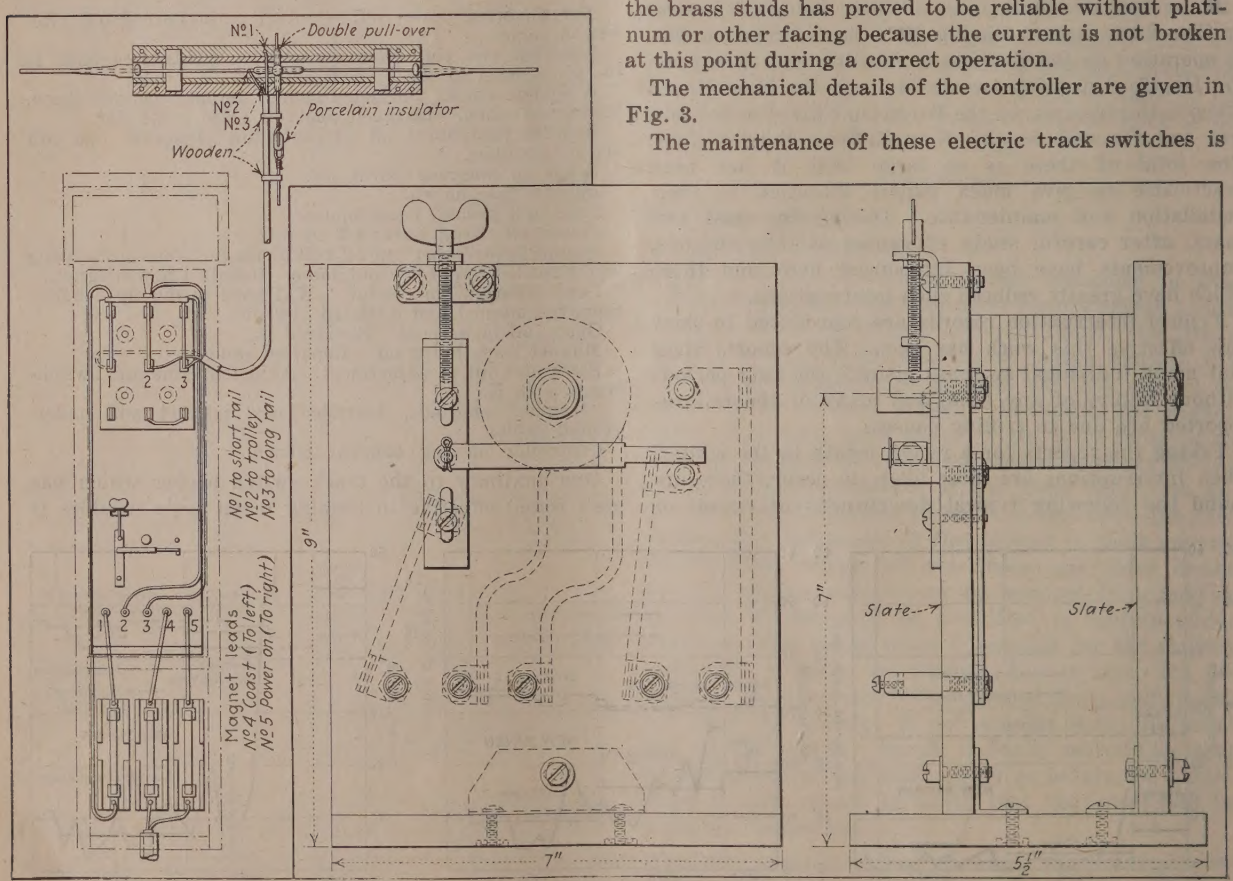


FIG. 2 (AT LEFT)—DETAILS OF MOUNTING AND CONNECTING OF ELECTRIC TRACK SWITCH CONTROLLER AND AUXILIARIES.
FIG. 3 (AT RIGHT)—MECHANICAL DETAILS OF ELECTRIC TRACK SWITCH CONTROLLER

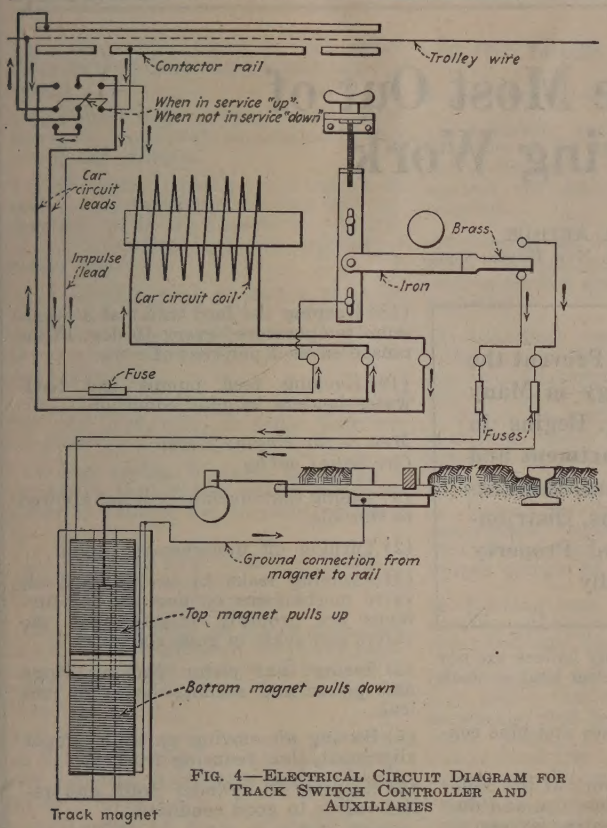


FIG. 4—ELECTRICAL CIRCUIT DIAGRAM FOR TRACK SWITCH CONTROLLER AND AUXILIARIES

under the supervision of two departments, namely, the line department and the track department. The line department maintains all the electrical parts, such as the contactor, the pole box and its contents, the overhead and underground cables, the track magnet, and the overhead sign. The track department maintains the main track box together with its links, the switch tongue, the auxiliary box, the underground conduit and the drain to the sewer.

The line department effects this work by means of a switch and signal maintainer, who is equipped in most cases with a Ford car and on the larger divisions he also has a helper. The track department likewise has a man who is experienced in the upkeep and adjustment of the links in the track box.

When a switch fails to operate as it should, it is the duty of the crew so finding it to report the trouble to a starter or dispatcher, who in turn reports the matter to the line department. These maintainers, in general, keep in close touch with the dispatchers, who more often report the trouble directly to the maintainer so that it may be repaired speedily.

The line department makes it a point to inspect these switches once a week and at that time all the contacts are cleaned and renewals made.

The track department inspects all switches every day, both those which are electrically operated and those which are not. At this time the working parts in the track box are cleaned.

When controllers or magnets become so worn or burned as to be unfit for good operation they are removed and delivered to the reclamation shop, where the necessary repairs are made.

E-241

REPORT OF OPERATION OF ELECTRIC TRACK SWITCHES

____ BRIDGEPORT . DIVISION

MONTH OF December 1921

Page No. 2.

Switch No.	Type	Location	Defects or Failures	Date
17	Squires	State & Main-East	None	
18	"	Fairfield & Water-West	None	

APPROVED: -signed- J. B. Potter SUPT. OR MANAGER

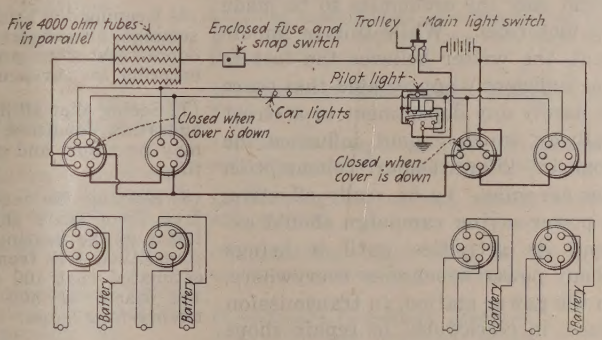
SUBMITTED: -signed- J. L. Merriman LINE FOREMAN

FIG. 5—REPORT FORM USED FOR RECORDING TRACK SWITCH INTERRUPTION RECORDS

Electrically Operated Marker and Classification Lamps

THE accompanying diagram shows the method adopted by the San Francisco & Sacramento Railroad to provide electrically operated markers and classification lamps which are not a part of the car. Lamps may be used the same as standard lamps, using two classification, or two markers, or all four lamps as desired.

The standard marker lamps were adapted to this purpose by the installation of 4 cp. automobile lamps with bayonet sockets to overcome the possibility of



WIRING DIAGRAM OF BATTERY CHARGING CIRCUIT AND BATTERY LIGHTS FOR CARS AND MARKERS

the lamps coming loose in sockets due to constant handling. A 6-volt battery was installed to provide current for the lamps when the trolley was off. This was also extended to provide lights inside of the cars at the same time and to give the train crew a visible warning that marker lamps were operating on the battery side.

Small coupler sockets were made and installed in the letterboards, and the ventilating top of the markers was removed and tubes were installed to carry a plug on the end of the cable when the lamps are being carried on hooks inside of the car, or being carried from one car to another.

No switches for connection were installed in this circuit, it being only necessary to hang the markers and insert the plugs. When lights are turned on inside of the cars the markers or classification lamps, or both, are also lighted. This is done to overcome the possibility on the part of the trainmen of forgetting to turn the lights on when it grows dark. This lighting circuit requires ½ amp. when operating the lamps, and it also provides ½ amp. trickle charge for the battery.

How to Get the Most Out of Energy-Saving Work

BY WILLIAM ARTHUR
Electric Railway Engineer, New Haven, Conn.

IT IS sometimes lost sight of that on a street railway the coal or power bill, except for wages, is the largest single item in operating expenses. As a general thing it will be found that with, say, a 6-cent fare, 3 cents will go for wages and 1 cent for coal or power, while the remaining 2 cents will be subdivided among all the other departments such as maintenance of tracks, maintenance of cars, interest and other items. To reduce the power bill, therefore, offers a most obvious and easily accomplished means of economy.

Many people, when they think of a power-saving campaign, have in mind only the economies to be made by motormen. While this is important, the writer believes the fact is not sufficiently appreciated that there is hardly any department in a street railway which cannot influence the coal or kilowatt-hour consumption per car-mile. To be really effective, a power-saving campaign should extend its activities until it brings about power economies everywhere, in the power station, in transmission lines, in trackwork, in repair shops and in many other departments.

With the above in mind, it has appeared to the writer worth while to make a list of the chief ways in which coal and power can be saved in the various departments of a street railway, so that men working in these departments might study the specific recommendations and endeavor to carry them out from day to day. Any property on which this is done will find that the cumulative effect of so many departments co-ordinating in the matter of power consumption will have a very gratifying result.

Employees Can Prevent the Waste of Energy in Many Ways — Saving Begins in the Power Department and Includes the Cars, the Carhouses and Shops, Distribution System and Property Generally

In the Power Station

Men in the Boiler Room Can Save Coal by

(1) Seeing that fires are kept at the proper thickness, neither too thick nor too thin.

(2) Avoiding all holes in the fuel bed.

(3) Avoiding unnecessary leaks of air into the combustion chamber.

(4) Seeing that too many boilers are not in use to take care of the load at each hour of the day.

(5) Reporting leaky flues and pipe connections.

(6) Keeping the brickwork of the boiler settings, also observation, fire and dust doors tight, thus preventing excess air entering the furnace.

(7) Seeing that all dampers are in good operating condition, so that the draft may be ample and under control at all times.

(8) Keeping the interior of all boilers free from scale and keeping the exterior of the heating surface and back connections free from soot. It has been estimated that 100 lb. of scale causes the waste of 400 lb. of coal each twenty-four hours.

(9) Keeping all baffles in good condition, so preventing the gases from being short-circuited to the flue connection.

(10) Not opening the fire or observation doors more than is necessary.

(11) Firing moderate quantities of coal each time.

(12) Exercising care at times of fire cleaning and dumping to prevent coke being thrown out with the ashes.

(13) Exercising care in feeding water to the boilers.

(14) Controlling the drafts so as to prevent safety valves from wasting steam by "blowing off."

(15) Maintaining normal pressure in boilers, as low steam pressure means more steam used by the engines.

(16) Stopping all leaks in blow-off valves, gage cocks, gage glasses, boiler drips, and pipe joints, also by keeping all valve packings tight. Many tons of coal are wasted each day by these items.

(17) Keeping all pipe covering and boiler covering intact. A bare pipe or surface radiates five times as much heat as a well-covered surface.

(18) Keeping the feed water at a maximum temperature; every 10 deg. F. increase saves 1 per cent of coal.

(19) Keeping feed pumps and feedwater heaters in good condition.

Men in the Engine Room Can Save Coal by

(1) Seeing that machinery is not allowed to run idle.

(2) Turning off unnecessary lights.

(3) Avoiding leaks by seeing that all valve mechanisms on engines and turbines are properly adjusted and the valves and seats in good condition.

(4) Seeing that piston packing rings and piston rod stuffing boxes do not leak.

(5) Having all moving parts in proper alignment, thus reducing friction.

(6) Keeping all cylinder drain and relief valves in good condition.

(7) Keeping all receivers well covered.

(8) Seeing that all steam traps are in good condition and are returning all clean condensation to the heaters.

(9) Keeping the condensers in good operating condition in order to maintain the proper exhaust pressures.

(10) Loading all generators to full load and shutting down all idle units, keeping the capacity in service as nearly corresponding to the load as possible.

(11) Avoiding all pipe joint leaks and defective pipe covering.

(12) Keeping accurate records of plant performance and investigating the causes of wide variations in results obtained.

(13) Substation operators can save coal by operating rotary converters at full load.

On the Cars

Motormen Can Save Coal by

(1) Running as little time as is necessary on resistance notches.

(2) Not holding power on too long.

(3) Coasting more.

(4) Not braking car too slowly.

(5) Not spending more time at end of line than schedule calls for.

(6) Not running too close behind another car.

(7) Not applying brakes unnecessarily.

(8) Reporting places where voltage of power seems low. This low voltage may be due to defective bonding or feeders, and so be a cause of wasted power.

(9) Being alert at all times, watching for persons wishing to board car, watch-

ing for vehicles ahead or any other thing in the street which might cause a delay.

(10) Using foot gongs; many slow downs or stops may be avoided by the timely use of gong.

(11) Promptly reporting car trouble in such a way that carhouse men will understand what the trouble is. Nearly every defect increases the amount of power used.

(12) Helping your conductor as much as possible. This means "team work." Don't lose interest if he holds you a few seconds at a stop. Sometimes he can't help it.

(13) Not talking to the motormen of the cars you ride on while they are on duty.

(14) Not trying to coast going up a grade, as this wastes power in resistances by causing too frequent notching up.

(15) Releasing your brakes as much as possible when stopped on level track; this saves time and power too.

(16) Using sand at all places where rail is bad. This enables all the power passing through the motors to be used to speed the car up, not in spinning the wheels.

(17) Stopping your car with the doors as near as possible to where passengers are standing; this saves many seconds at each stop.

(18) Opening all doors at places where a number of persons board car; this is a great time saver and therefore a coal saver.

(19) Passing over and through special work and curves at a safe speed with power off and brakes released. You are then less likely to have to stop due to pole coming off. Thus you save time and power.

(20) Using power for as short a time as possible to throw electric switches. The switch pan is not more than 3 ft. long, yet some motormen have power and brakes on for 100 ft.

(21) Passing under section insulators with power off.

Conductors Can Save Coal by

(1) Attention to doors and starting signals and being quick with change, causing motormen not to lose time and so not requiring more power to make it up.

(2) Turning off lights and heaters whenever possible.

(3) Removing trolley pole as soon as car is placed in carhouse.

(4) Calling names of streets. This gets the passengers to the door ready to get off when car stops.

(5) Looking ahead when car slows up or when motorman strikes gong and being ready to give go ahead signal if car shall pass obstruction.

(6) Reporting as soon as possible everything that might cause a delay.

(7) Opening back doors when several passengers are leaving car.

(8) Being alive at all times to methods of avoiding delay; the more time wasted, the more power wasted.

In the Shops and Carhouses

Repair Men Can Save Coal by

(1) Adjusting brakes so that the full efficiency of the brakes is obtained and yet so they do not hold the shoes tight against the wheels when brakes are released.

(2) Keeping all bearings and rubbing parts clean and well lubricated; this decreases friction and therefore the power required.

(3) Adjusting controllers so that a motorman can feed them properly, seeing that all connections are tight and that no arcing takes place when handle is moved on or off. A controller which is arcing causes a motorman to lose time and so wastes power.

(4) Seeing that all air leaks are taken up, that all packings are tight, that the motorman's valves work freely, and that the governors are set with the proper margin of variation.

(5) Keeping sand boxes full, also that sanding apparatus is in good working order and sand pipes over the rail.

(6) Adjusting trolley base tension properly, seeing that collector springs bear on wheels; that bushings are not badly worn. Defects in trolleys cause delays and so force the motormen to use more power to make up for lost time.

(7) Adjusting foot gongs so that they ring loud enough, and so that foot plugs do not stick or jam.

(8) Sectioning resistances so that the car shall start smoothly. This is most important.

(9) Keeping all insulation in good condition, so there shall be no leakage of current when car body becomes wet.

(10) Avoiding unnecessary shifting of cars in shops.

(11) Turning off all unnecessary lights, compressors and heaters, and shutting down all machinery running idle.

(12) Adjusting circuit breakers to act at proper current value. Defective circuit breakers waste time and so waste power.

(13) Not causing cars to be held at carhouses, waiting for cars from shop.

Cleaners and Others Can Save Coal by

(1) Turning off lights and heaters whenever possible.

On the Road

Line Men Can Save Coal by

(1) Avoiding unnecessary mileage of line cars or trailers.

(2) Having all feeder taps and ears tight. Loose connections mean increased resistance and so loss of power.

(3) Adjusting all circuit breakers in feeder jumpers so that they do not act at too low a current value, thereby causing unequal voltages.

(4) Insulating feeders that pass through branches and foliage of trees. This will prevent slight leakages of current.

(5) Keeping electric switches in working order, as there is a large amount of power wasted by motormen when switches operate sluggishly.

(6) Setting overhead work so as to reduce number of dewirements.

(7) Using lights and heaters in line cars only when necessary.

(8) Not holding cars more than necessary at places where gangs are working.

Line Repair Men Can Save Coal by

(1) Seeing that defective feeders are promptly repaired.

(2) Seeing that lamps and heaters in line cars and linemen's quarters are turned off when not actually required.

(3) Using automobile tower trucks, when they are available, in preference to line cars.

(4) Using the lowest permissible wattage lamps in lamp banks, waiting stations, etc.

(5) Removing trolley poles from trolley wire when cars are not in use in carhouses and yards.

Roadmasters and Track Men Can Save Coal by

(1) Caring for bonding, seeing that no bonds are loose or broken.

(2) Operating welding, grinding and tamping machines as economically as is possible, and seeing that they are in good condition.

(3) Avoiding unnecessary mileage of work cars.

(4) Not holding cars longer than necessary at points where gangs are working.

(5) Keeping curves and special work well greased.

(6) Removing flags used to protect workmen as soon as possible.

Dispatchers, Inspectors, Starters and Instructors Can Save Coal by

(1) Not causing unnecessary mileage.

(2) Observing car defects and reporting them as soon as possible.

(3) Seeing that lights and heaters are in use only when necessary.

(4) Cautioning or advising car crews, when observed to be operating improperly.

(5) Pointing out to new men or others whom they instruct the necessity of economical operation.

Other Employees in Offices and Elsewhere Can Save Coal by

(1) Being near exits when car is stopping, so as to avoid delay.

(2) Setting example to other passengers in regard to being at proper stopping places, and in other ways so acting as to avoid delay.

(3) Reporting anything noticed which may cause delay, for delay in the end always means more power to make up for lost time.

(4) Not using lights or heaters in offices when not necessary.

LEFT—INSIDE MOTORMAN'S CAB, SHOWING REGISTRATION DIAL AND VERTICAL RODS. CENTER—ONE OF THE SPOKANE CARS IN SERVICE. RIGHT—REGISTER AND DIAL ON BULKHEAD INSIDE CAR

One-Man Interurban Cars Used in Spokane

The Spokane & Eastern Railway Has Remodeled Several of Its Interurban Cars to Permit of One-Man Operation—Competition from Buses Made Economical Operation a Necessity

ONE-MAN interurban cars to compete with one-man interurban motor buses have been introduced in Spokane by the Spokane & Eastern Railway with good results. Motor buses have invaded the territory of the Spokane & Eastern interurban lines both east and south of Spokane and particularly between the city and Liberty Lake. It is on this run that the company is introducing one-man interurban cars.

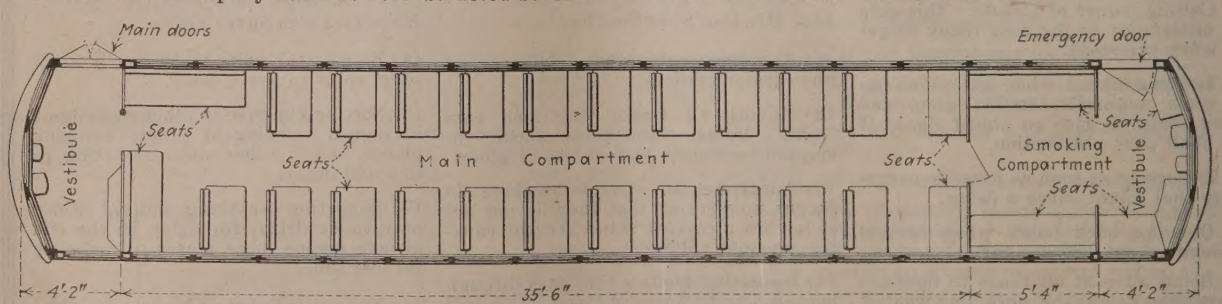
The Spokane & Eastern interurban cars were built here two years ago in the company's shops. New trucks and electrical control were installed. These cars have now been rebuilt for one-man operation. During the reconstruction the cars were "turned around"; that is, the motorman's cab was constructed on the rear vestibule of the old cars.

One of the remodeled cars is shown in the accompanying illustration. They are 52 ft. 7 in. long, 8 ft. 6 in. wide and 8 ft. 6 in. high, inside. The seating capacity is sixty-five passengers and the standing capacity about 110.

The car will make the 19 miles to Liberty Lake, with twenty-one flag stops, at an average of 18.95 miles an hour. The maximum speed will reach 30 to 35 miles an hour between stations. Hourly service is scheduled for the line. Five one-man cars are now completed and seven more will be added to the service in a short time. The company has also reconstructed several of its old two-man cars into the one-man type with a motorman's cab at each end. The reconstruction of all cars was done under the direction of Superintendent J. F. Gannaway and A. H. Mayham, master mechanic for the Spokane & Eastern shops.

In order to facilitate the rapid handling of fares and tickets and to assist the auditors of the company in analyzing the day's business the Ohmer fare register, No. 60, was installed in the cars, as shown in the illustrations. Two dials are used for indicating the registration. One of these is located inside the motorman's cab in a horizontal position on the bulkhead just at the bottom of the window. The other is located at the top of the bulkhead inside the car. When a fare is received the operator sets the dial in his cab according to the fare to be registered. Two vertical rods connect this dial with the one inside the car so that the indications are the same on the two dials. The registration is made by pulling down on the handle which slides on one of the vertical rods. This system has proved very satisfactory.

Twelve Ohmer registers of the new No. 62 model have been ordered by the company for use on this type of car. The arrangement in the motorman's cab and in the passenger compartment is practically the same, but the register is built to record any amount from one cent to $9.99 and nine separate ticket fares. In addition, each station is given a zone number, and from this the auditors can ascertain the record of passengers picked up at each station. A record is automatically made of the zone number, the direction of the car, the register number, the amount of cash received or ticket fare, a consecutive fare number, the date and the conductor's number.



FLOOR PLAN OF ONE-MAN INTERURBAN CAR

Relation Between Temperature and Power Used by Electric Cars

Tests Indicate That More Power Is Used During Cold Weather—Present Methods of Lubrication Appear to Be Responsible for a Large Part of the Increase

BY A. W. BAUMGARTEN
Electrical Engineer Chicago & Joliet Electric Railway, Joliet, Ill.

IN THE past few years much time and study have been devoted to obtaining more efficient operation in order to reduce the power costs of electric railways. Railways are now realizing that the weight of the heavy type cars is responsible for a large part of the power cost, and they are resorting to the lighter type car to save power. However, most of the methods used to improve power efficiency and savings involve a large expenditure of money and consequently most of the railways are not in a position to adopt them.

One very successful method of obtaining power efficiency in use on many properties today is to improve the operating efficiency of their motormen by the use of meters installed on the cars. This does not involve a very large financial investment, and it offers a very good means of studying other faults involved in car operation and maintenance.

The writer has had the opportunity of studying and instructing carmen in the operation of cars through the use of watt-hour meters installed on the cars for the past seven years with good results. The watt-hour meter has also been used to check up the adjustment of equipment. For instance, too much stress cannot be put on the proper adjustment of brake equipment. It has been found that a car can easily use 10 per cent to 25 per cent more power than necessary by having tight or unequal brake adjustment and causing large friction losses. We must bear in mind that every foot-pound of energy expended in friction must come from the trolley.

A very interesting problem which the writer observed, and which has probably not been seriously considered in connection with car operation heretofore, is the effect of temperature on the energy per car-mile. In order to determine the effect of temperature alone, it was necessary to study the effect of passenger loading.

To do this, graphs similar to those in Fig. 1 were plotted for a period of several months showing the average kilowatt-hours per car-mile for the system, the average atmospheric temperature, and the passengers per car-mile for each day.

Table No. 1 was obtained from these graphs by recording the kilowatt-hour per car-mile and passengers per car-mile for each of the temperatures given, and by calculating an average for each temperature.

Table II was obtained by taking the kilowatt-hours per car mile and the temperature for various loading of passengers per car-mile in groups from 3.60 to 4.20 passengers per car-mile, and an average calculated for each group. The figures thus obtained were then corrected to 30 deg. and 75 deg. temperature from a preliminary curve plotted from Table I, and the corrected values are given in Table II.

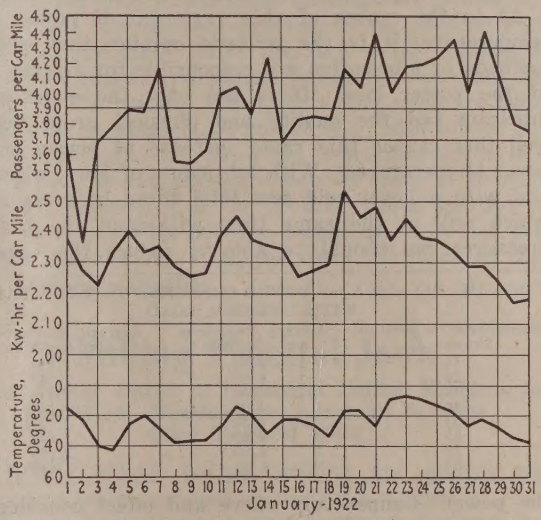


FIG. 1—TEMPERATURE, POWER CONSUMPTION AND PASSENGERS CARRIED DURING JANUARY, 1922

These figures were plotted giving the two curves at 30 deg. and 75 deg. temperature, the points of which are shown in Fig. 3.

From these curves the figures of Table I were corrected for a uniform loading of four passengers per car-mile as shown in Table III.

These figures were then plotted as shown in Fig. 2. The other curves for each 5 deg. change of temperature on Fig. 3 were interpolated from Fig. 2. It is interesting to note that the effect of passenger loading on the power per car-mile becomes less at the lower temperatures—that is, the slope of the curve becomes less and approaches zero. Although the power per car-mile from the curves of Fig. 3 probably will not apply to other properties, it will be found that the rate of change

TABLE I—RELATION OF POWER CONSUMED IN OPERATION TO TEMPERATURE

Atmospheric Temperature, Degrees F	Average Passengers per Car-Mile	Average Kilowatt-Hours per Car-Mile
15	4.01	2.410
20	3.92	2.380
30	3.86	2.320
40	3.82	2.240
55	3.96	2.120
65	3.79	2.070
75	3.87	2.080
81	3.86	2.030

TABLE II—AVERAGE POWER CONSUMED AT TEMPERATURE OF 30 AND 75 DEGREES F.

Passengers per Car-Mile	Temperature, Degrees F.	Average Kilowatt-Hours per Car-Mile	Temperature, Degrees F.	Average Kilowatt-Hours per Car-Mile
3.60	30	2.280	75	2.03
3.70	30	2.290	75	2.045
3.80	30	2.300	75	2.052
3.90	30	2.290	75	2.065
4.00	30	2.310	75	2.075
4.10	30	2.312	75	2.082
4.20	30	2.320	75	2.093

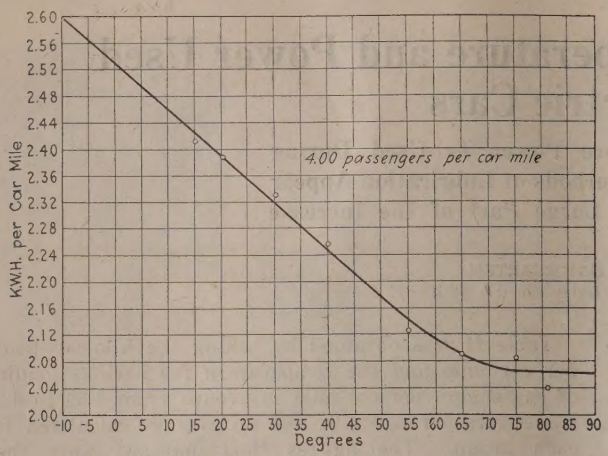


FIG. 2—POWER USED PER CAR MILE WITH VARIATION OF TEMPERATURE

of energy per car-mile with the atmospheric temperature and with the passenger loading will be about the same.

As to the causes of this variation of power with temperature, it is the writer's opinion that present methods of lubrication are responsible for a large part of the power loss. It is not only the quantity of lubricant but the quality and physical properties as well that causes this rapid increase of power at the lower temperatures. With lubricants of lower viscosity and with a lower cold test than those in present use which will at the same time withstand the bearing pressures, we should be able to reduce the slope of the power—temperature curve and effect considerable savings of power.

TABLE III—RELATION OF POWER CONSUMED TO TEMPERATURE WITH UNIFORM LOAD

Atmospheric Temperature, Degrees F	Average Passengers per Car-Mile	Average Kilowatt-Hours per Car-Mile
15	4.00	2.410
20	4.00	2.385
30	4.00	2.330
40	4.00	2.255
55	4.00	2.125
65	4.00	2.090
75	4.00	2.085
81	4.00	2.040

In the automobile industry the manufacturers endeavor to lubricate every part where friction occurs—not as little as possible, but all that each part will take without undue loss of oil. With railways it has been the custom to do as little lubrication per 1,000 car-miles as possible, without consideration of the power losses.

The majority of hot journals and bearings occur in the cold weather which in itself is an indication of poor lubrication due to the low temperature at which the oils do not feed properly. Also there are many parts such as parts of the brake rigging of the railway car which is lubricated very little or not at all, causing the brakeshoes to drag against the wheels with high friction losses because the release springs cannot react properly. The writer has observed losses of 50 to 75 kw.-hr. per car per day for this reason alone.

Therefore, it seems possible that considerable saving of power and equipment can be accomplished by a change of lubrication methods at very little additional cost.

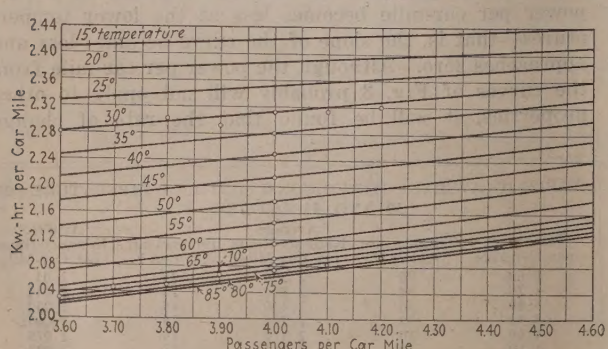


FIG. 3—POWER USED WITH VARIATION OF TEMPERATURE AND PASSENGERS CARRIED

Convenient Babbitting Furnace

THE accompanying illustration shows a Johnson direct-jet No. 600 furnace used in the shops of the Eighth Avenue Railroad, New York, for melting babbitt. It also has been found convenient for tempering, case hardening and annealing, as well as for soft metal melting. The furnace proper is 18 in. high and sets on three legs, which raise the bottom 10 in. from the floor. This gives an over-all height of 28 in. An attachment at the side supports a cover for the melting pot and a wooden handle at the side provides for swinging this out of the way as required. The furnace is of sufficient size to take a 400-lb. melting pot, but a size holding from 200 to 350 lb. is used by the Eighth Avenue Railroad. The gas supply pipe is 1¼ in. in diameter, and is provided with a shut-off cock which can also be used to regulate the supply. The furnace is fitted with six Johnson direct-jet atmospheric burners which mix the right amount of air with the gas to produce complete combustion and to obtain the maximum heat possible without the use of a forced air blast. This type of jet directs the flame in correct alignment with the Bunsen, and maintains the highest possible velocity at the nozzle. The orifice is adjustable, as is necessary to provide for variations in the pressure of gas.

FURNACE USED FOR MELTING BABBITT

The gas consumption is 75 cu.ft. an hour, and the furnace will melt 350 lb. of babbitt in fifty minutes. Other soft metals, such as lead, zinc, and tin, can also be efficiently melted if desired.

Equipment and Its Maintenance

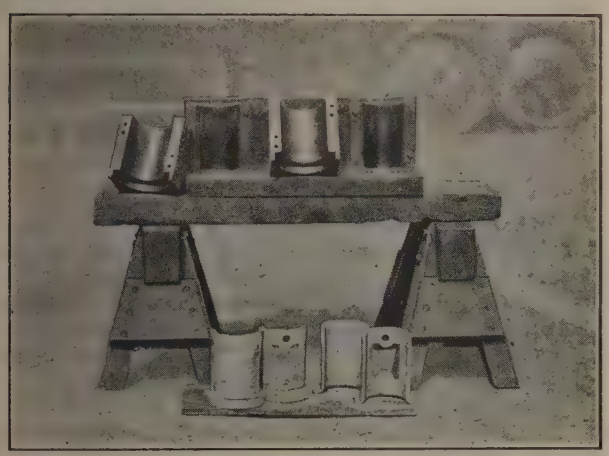
Short Descriptions and Details of New Apparatus of Interest to the Industry. Mechanical and Electrical Practices of All Departments

Aluminum-Base Metal for Motor Bearings Gives Low Cost

Use of This Material in Youngstown Involves a Net Cost Lower than for Bronze, with Equivalent Wear During a Year's Test

By A. B. Creelman
Master Mechanic Youngstown (Ohio) Municipal Railway

About four years ago when it was difficult to get bronze a set of four molds was made up with which to pour solid babbitt bearings for G.E.-247 motors. After trying out a dozen different brands of ordinary babbitt metal, this practice was given up as too expensive, for many of the bearings were too hard and broke and others failed because the babbitt was too soft. Since that time, an aluminum base material, called "Elmore U. S. metal," has been tried for motor bearings and it has worked out satisfactorily. Bearings of this material have been in service for about a year on the motors of twelve cars and they are apparently giving as good wear as the bronze bearings.



Molds for Casting Finished Babbitt Motor Bearings

The net cost of bearings made with this aluminum base is about 12 per cent of bronze bearings. Bronze bearings cost $5.30 per pair for labor and material and have a scrap value of 70 cents, leaving a net cost of $4.60 per pair. The aluminum-base babbitt bearings cost $2.70 a pair and have the high scrap value of $2.16, since the material can be remelted. Therefore the cost of the useful wear in a set of these bearings is only 54 cents.

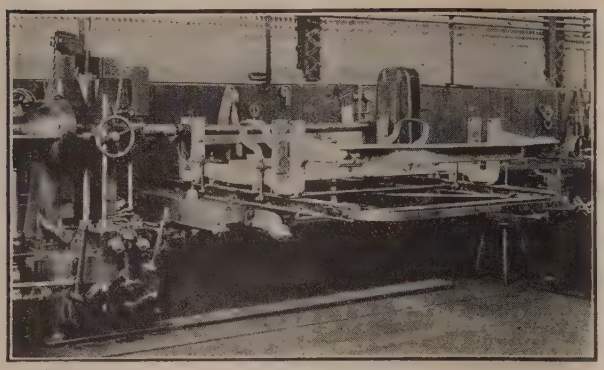
The molds into which these bearings are poured are so arranged that the bearings require no machine work after they are cast. After they are merely cleaned up around the edges on an emery stone, they are ready for service in the motor. When the motor axles are badly worn some breakage has occurred with both bronze and babbitt bearings, but when the bearing and the axle have a snug fit the aluminum babbitt metal is showing just as good service as the bronze. Since the test on these twelve cars is not yet completed, it is not possible to give figures as to the exact performance cost per thousand car-miles.

Milling Pedestal Jaws

Special Frame Fitted to Horizontal Boring Machines for This Work—Machine Also Adaptable to Many Other Types of Work

A horizontal boring, drilling and milling machine, which has been in use for a number of years in the Harvard Shops of the Cleveland Railway, has been found to be one of the most valuable of any of the machine tools installed. The adaptability of this tool is such that it can be set up for a number of jobs that must be done in an electric railway shop, but which usually require the use of a number of separate machine tools. Three of the accompanying views show as many distinct operations for which the machine is ordinarily employed. The first of these illustrates the set-up of the machine for milling the pedestal jaws of a truck frame to the correct width so that wearing plates can be inserted between the jaws and the

At Left, Milling the Pedestal Jaws of a Truck Frame with a Horizontal Boring, Drilling and Milling Machine. At Right, Milling Axle Caps for Dowels



PLANING AXLE BRASSES

journal box. For this particular work, a special frame on which to mount the work has been constructed from two lengths of rail and several rods. The base of one rail is secured to the platen while the other rests on the base of the back rest. The truck frame is held down with pins, eyebolts and plates connected as shown. The horizontal milling attachment, consisting of two cutters mounted on an arbor, is used, thus making it possible to resurface the corresponding sides of opposite pedestal jaws simultaneously. To bring the other pair of jaws into position for milling, the auxiliary and truck frame must be turned end for end.

A simpler operation performed on this machine is the milling of axle bearing caps for dowels as shown in an illustration. The back rest is moved up to the platen and a gang cutter mounted on a short arbor is inserted in the driving spindle.

A third set-up, one for planing axle brackets, is also shown in an accompanying illustration. For this job, the vertical milling attachment is inserted between the head and back rests and a shell-end cutter is used. Work of this sort is done principally to fill in among the more difficult milling operations, for which the tool is especially adapted.

There are three other distinct operations which are customarily done on this machine but which are not illustrated herewith. These are the drilling and facing of car couplers, the lining up and tightening of armature cores which have become loose and skewed on the spiders, and the reboring of motor housings which have been repaired by welding. One of the illustrations shows a repaired motor casing which has been welded across one bearing and is ready to be rebored. More than 100 housings have been welded and machined thus without single failure.

The Lucas Machine Tool Company, Cleveland, is the manufacturer of this horizontal boring machine.

WELDED MOTOR HOUSING READY TO BE REBORED

Tapping Trolley Wire Without Interrupting Car Traffic

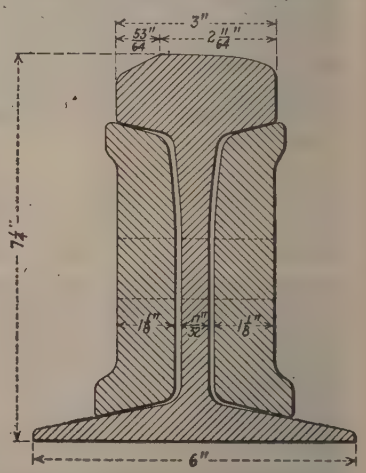
A PORTABLE equipment for making contact with the overhead trolley wire in order to obtain current for operating tools for track repairs has been built by the Market Street Railway of San Francisco. This trolley wire tap is arranged so that it is not necessary to remove the device when a car passes. The device consists of a broad based steel standard, which can be set at a proper distance from the track. This has an arm at the top of sufficient length to extend to the trolley wire. At the outer end of the arm is a contact plate which fits about the underside of the wire so closely that it does not interfere with the passing of a trolley wheel. Ropes are provided for adjusting the arm to the proper height, and the current is carried by cable from the contact to the machinery to which power is supplied.

TAKING CURRENT FROM TROLLEY WIRE IN SAN FRANCISCO

Novel Rail Section for Cleveland

THE Lorain Steel Company is rolling for the Cleveland Railway a rail of new section, which will be known as Sec. 102 No. 506. It is a modification of Sec. 95 No. 400, with the web thickened under the head, the height increased ¼ in. and the head formed with a contour like that of the A. E. R. A. standard girder rails. This section is added to the present series; that is, it does not replace another.

The splice bars are designed to facilitate welding, as they are used in making what is known as the C. H. Clark joint. The bars clear the rail web by about ⅛ in.



RAIL AND JOINT-PLATE SECTION LORAIN 102-506 NOW BEING ROLLED FOR CLEVELAND

In Cleveland the joints are made with 8-hole plates, riveted together with 1 1/16-in. Myari steel rivets 5¼ in. long. The riveting takes up the clearance and draws the bars to a perfect bearing top and bottom. The plates are seam-welded to the rail top and bottom. Base plates underneath the joints are used also, with the rail base welded to the plate. Mr. Clark reports that the joints so far installed are giving good satisfaction.

In making the joints the Cleveland Railway is cutting the rail ends on a 10-deg. miter.

Combination Rest Room and Repair Shop Under Ferry Loop

THE accompanying illustration shows the entrance to the repair shop and rest room for railway employees which has recently been built under the ferry in front of the ferry building in San Francisco. This space was previously occupied by an old cable car loop pit, and half of the space available has now been trans-

ENTRANCE TO REST ROOM AND REPAIR SHOP UNDER FERRY LOOP

formed into the rest room and repair shop. There are lockers for the men with wash rooms, etc. The entrance is closed by two steel doors, around which there is a pipe railing. Access to the rest room is gained by means of a steel ladder. A large electric gong is installed at the opening for calling various employees, such as superintendents, inspectors, repairmen, starters, etc., each of which has a code number.

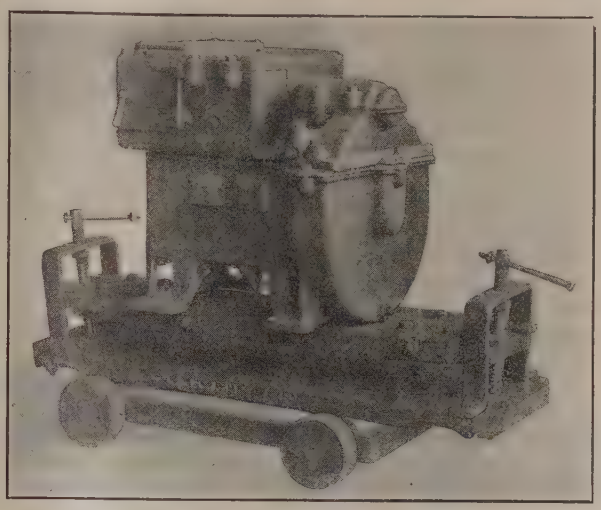
A Convenient Compressor Truck

The New York State Railways Has Supplied Its Maintenance Shops with a Platform Truck with Movable Table for Removing and Reinstalling Compressors on Cars

THE accompanying illustration shows a type of truck constructed in the shops of the New York State Railways and used for removing and reinstalling compressors on cars. This truck has a platform which can be raised and lowered by means of screws at either end, so that a compressor can be lowered from its position on the car body sufficiently to clear any obstructions and then be hauled away to the compressor overhauling bench by one man.

The frame of the truck is made of 1-in. x 2-in. channel irons and is 22½ in. wide x 31 in. long. Two axles are located 4 in. from the ends of the frame by boring holes in the channel iron framework. The axles are clamped to the frame. The wheels are 6 in. in diameter and 2 in. wide, made of wood with band iron tires and steel bushings in the center to serve as bearings. They are fastened on the axles by means of cotter pins.

The stationary platform is made of oak 13½ in. wide x 47 in. long x 1¾ in. thick. This is securely bolted to the channel-iron framework. The raising and lowering table is also made of oak 12 in. wide x 37 in. long. It is raised and lowered by means of two small screws at the ends of the table. These screws are 1⅛ in. in diameter and 8 in. long. They are threaded four threads to the inch and have a large nut 1½ in. x 2½ in. x 8 in.



COMPRESSOR TRUCK WITH RAISING AND LOWERING TABLE

at either end, which works up and down between guides as the screws are turned. The ends of the table rest on two pieces of strap iron, which in turn rests on the nut, so that the table is raised or lowered as the screw is turned. As constructed the table has a range of 8 in. in travel, which has been found ample for removing all ordinary compressors from cars. The general details of construction are shown in the accompanying illustration.

Construction of Edinburgh's Overhead Line Finished

AS already announced in these columns, the Edinburgh Corporation Tramways is changing to overhead current collection. The acompanying illustration shows the connecting up of the final section of its first overhead electric line.

TOWER TRUCK CREWS COMPLETING EDINBURGH'S OVERHEAD LINE

When the Negative Bus Is Positive

BY G. H. MCKELWAY
Engineer of Distribution, Brooklyn (N. Y.) Rapid Transit Company

THAT the negative bus of a power or substation could ever be positive to anything will seem to many persons to be so manifestly impossible that a statement that such a condition does often occur appears not only untrue but absurd as well.

However, it is a fact that on systems having two or more power or substations there will often be found to be differences of potential between the negative buses of the different stations, which is only another way of saying that some of the negative buses will be positive to others.

Take, for instance, a system of lines fed from two stations the positive buses of both being joined by tie lines or through feeders from both stations feeding into the same lines outside. Then, if one station should be shut down, but its bus kept alive from the other station by means of these ties, current would still continue to flow out from the positive bus through its feeders and much of this current would return to the negative bus of the idle station, although all of it, eventually, would return to the negative bus of the station where it was generated. Therefore, at the station that had been shut down, there would be found to be current returning to the negative bus over certain of the return wires, and leaving that bus for the negative bus of the generating station over other return wires.

In the same way, although not so obvious, it will be found that it is not necessary for one of the stations to be entirely shut down before the potential of its negative bus is higher than that of a neighboring station, but that it will be necessary only that one station lower its voltage enough to permit the other to pick up a part of what would normally be the first station's load, and the same condition will occur although much less noticeably.

In fact, with two or more stations close together and all feeding into approximately the same lines, the fluctuations of voltage caused by ordinary variations in load will be sufficient to cause current to flow out from the negative bus many times in a day.

This fluctuation of voltage and current flow makes it unwise, on a large system, to follow the same practices for the prevention of electrolysis of the cable sheaths that are considered as standard on smaller roads. On a small line the cable sheaths are generally bonded to the negative bus of the station and that is all that it is considered necessary to do to prevent any trouble. But, as has been shown above, on a larger system it is not certain that such drainage will prevent electrolysis. On the contrary, at some hours of the day, the cable sheaths, if connected to the negative bus, may furnish a path whereby current may leave that bus and, after following the sheaths for some distance, leave them at some remote point or points and there cause more trouble than would have occurred if the sheaths had not been bonded.

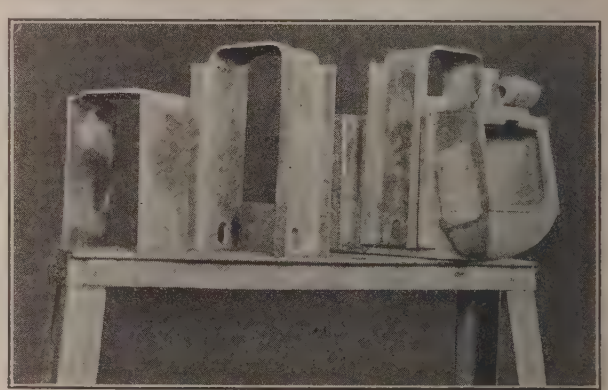
Therefore on many of the larger systems it is no longer the practice to attempt to drain the sheaths of negative current by bonding them "hard" to the negative bus, but instead a switch is placed in the circuit so that it will or can be opened when the direction of current flow changes.

These switches are sometimes automatic but more often are merely the ordinary hand-operated knife switch which is opened whenever the station is shut down or when the ammeter in the circuit shows that current is leaving the bus. Where such ammeters are used on the negative side as well as on the positive it is the custom to have them read at regular intervals and the readings recorded on the regular feeder sheets just as is done with the readings of the ammeters on the feeder panels.

The use of portable recording instruments of the smoked chart type, if occasionally put into the circuit, will show that often when the ammeters of the ordinary switchboard type are not sensitive enough to record any current, the voltage on the bond wire will be fluctuating, the readings showing that part of the time the potential of the negative bus is higher than that of the cable sheaths, and vice versa. The writer knows of one occasion when simultaneous readings on the bond wires leading to the negative bus from the high and low tension cables at one station showed that current was coming into the station on the sheaths of the d.c. cables, which ran out principally in one direction, and was leaving the station on the sheaths of the a.c. cables which ran to another station in a different direction.

Renewable Wearing Plates for Both Journal Boxes and Truck Frames

FOR a number of years the cars of the Cleveland Railway have been equipped with double wearing plates between the journal boxes and sides of the truck frame jaws. Both of these plates are continuous, being stamped from ⅜-in. sheet steel strips and bent to form

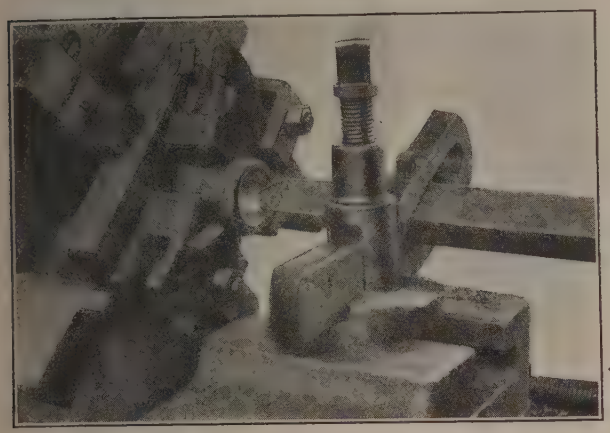


RENEWABLE WEARING PLATES FOR JOURNAL BOX AND TRUCK FRAME JAWS

U-shaped pieces. One pair of plates is slipped over the journal box and is held in place by the journal box guides. The outer pair of flanged plates is bolted to the truck frame jaws. The tops of these two renewable wear plates form the bearing surfaces for the coil spring over the journal box inserted between them. Thus these plates are held from rattling by the weight of the car, a scheme which has worked out with considerable success. Protecting the wearing surfaces of both the journal box and of the yoke means that the life of these parts has been materially increased at a small cost.

One set of these plates before assembling and another set assembled on a journal box are shown in the accompanying illustration. The pair of plates on the left was formed by using a bulldozer, while the other pair was formed in a press with a set of dies.

Handy Jig for Boring Brakeshoe Heads



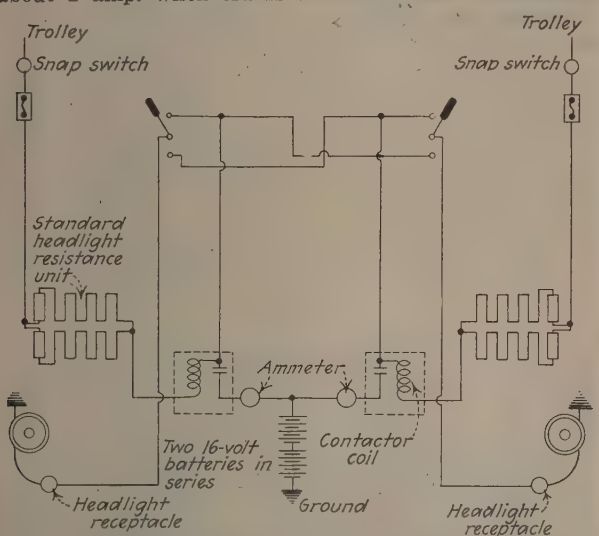
LATHE SET UP FOR BORING BRAKESHOE HEAD

THE accompanying illustration shows the set-up in a lathe of a brakeshoe head for boring as used in the shops of the Northern Ohio Traction & Light Company, Akron, Ohio. The brakeshoe head is clamped to an iron block by two clamps at either end. The block is then placed in the chuck of the lathe and adjusted to its proper position.

Headlight Circuits with Storage-Battery Booster

IN ORDER to overcome varying intensity of headlights, due to fluctuation of line voltage, the San Francisco & Sacramento Railroad has connected its headlights with a storage battery in circuit, as shown in the accompanying diagram.

With this arrangement, the battery is charged at about 1 amp. when trains are in front of substations



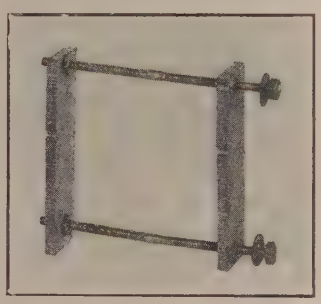
WIRING DIAGRAM FOR BATTERY HEADLIGHTS

and discharges about 2 amp. when the voltage is low between stations. Standard 32-cp., 250-volt locomotive-type lamps are used in "Golden Glow" 14-in. reflectors, which provide a light that illuminates an 80-ft. right-of-way clearly for 1,000 ft. and is not affected by voltage fluctuation either in starting or in running. This arrangement has been in operation about six months on trains operating altogether at night. Arrangement has been made in this circuit to use the headlight resistance as cab heaters for the motormen and to permit selection of either resistance from both ends of the car.

Eliminating Controller Connection Boards

BY W. B. UFFERT
Master Mechanic New York & Harlem Railroad, New York, N. Y.

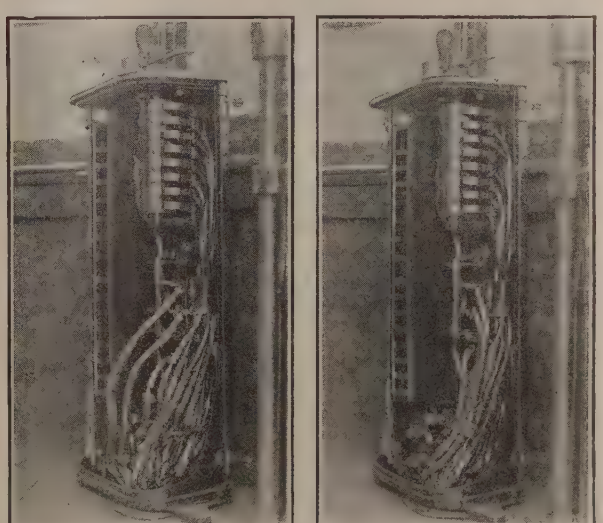
THE New York & Harlem Railroad has a number of old-style type "K" controllers in service. Considerable trouble was caused from open circuits and short circuits at the connection board. The terminals were of the screw type, and due to screws working loose, poor contact resulted which caused burning, short circuits and even controller explosions. Due to the cramped condition where the leads came in, it was almost impossible to keep these free from dirt, and the dampness and carbonized terminal conditions caused a creepage of current which ultimately resulted in short circuits. It was also very difficult to make a good soldered joint, due to the limited space available.



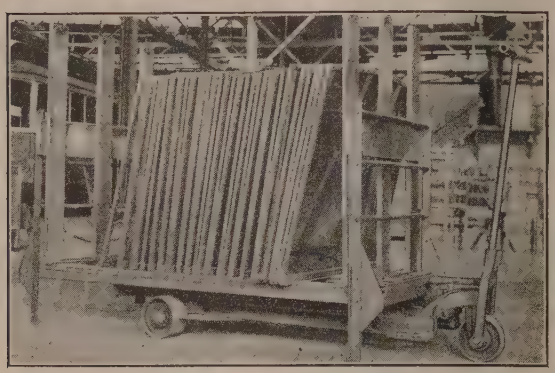
CLAMPING BLOCK USED TO SECURE LEADS

To remedy this condition, the connection board was cut off and the lower section which had the connecting terminals was removed. The upper section on which was mounted the motor cut-out switches was not disturbed. To connect the incoming leads from the motors and resistors to the controller leads, Frankel two-way soldered connectors were used. These permit the cables to run straight and their use provides a positive joint.

Accompanying illustrations show how these connectors are used for making the connections and also how the leads are taped and clamped in place. After the connectors have been installed, the joints are thoroughly taped up and grouped in proper position. Clamping screws with fiber blocks hold the leads.



AT LEFT, LEADS CONNECTED WITH CONNECTIONS. AT RIGHT, FINISHED INSTALLATION OF LEADS IN CONTROLLER



AT LEFT, CAR WINDOWS LOADED ON SPECIAL FRAMES ARE HANDLED WITH A LIFT TRUCK. AT RIGHT, THE SASH BELONGING TO EACH CAR IS KEPT ON A SEPARATE RACK

Sash Handled with Racks and Lift Truck

AN EFFICIENT system for handling car windows while the cars are undergoing repairs or are being painted has been in use for some time in the Harvard shops of the Cleveland Railway. As the windows are removed from the cars which are being stripped in preparation for washing and painting, they are loaded on a rack as shown in an accompanying illustration. A hydraulic lift truck is then run under the loaded rack and the two units are transported ensemble to the paint shop from the wash house. The car number chalked on the rack identifies the sash.

The loaded racks are lined up in a space provided for them in the paint shop as shown. They are then taken from these racks, cleaned, painted and stored in drying frames. When the paint has dried, the sash is replaced on the same rack, when the lift truck is again brought into play to transport the refinished sash to the car.

For this purpose about eighteen racks are employed with but one truck to move them about. Steel angle irons form the vertical and horizontal members of each frame, to which is bolted an inner wooden rack. They were built in the railway shops.

Underwater Coal Storage in the Twin Cities

Reserve Supply for the Railway Power Plant Is Stored in Two 14,000-Ton Reinforced Concrete Bins to Eliminate Fires from Spontaneous Combustion

THE storage of coal under water in concrete pits constructed for that purpose to eliminate fires from spontaneous combustion has been resorted to by a number of public utility companies and other large coal users. Up to several years ago the Twin City Rapid Transit Company, Minneapolis, Minn., was caused considerable trouble and much expense because of fires that broke out from spontaneous combustion in its huge piles of stored coal. Although most of the coal never reached the actual ignition point, there was a marked deterioration in its calorific value because of the heating. These difficulties have been largely remedied by the construction of two concrete storage bins.

The power plant itself is so located on the lower river bank, only a few feet above the level of the Mississippi, that it is hemmed in on two sides by the steep embankments which rise to the upper ground level. When ordinary storage methods were followed space limitations meant that often the coal had to be piled higher than was known to be safe.

One of the 14,000-ton bins was constructed in a small space on the east side of the power plant. The reinforced-concrete structure, which is completely above the ground, is basin-shaped and is supported at the outer edge by vertical concrete columns. The bin is divided into four compartments, each of which can be flooded and filled separately. The loaded coal cars are shunted onto a trestle, level with the top of the bin, and by means of a locomotive crane the coal is unloaded and dumped into the bins, which are previously filled with water. The coal is removed with this same crane and dumped into a hopper at the junction of the four partition walls. From the bottom of the hopper a belt conveyor carries the fuel to bucket conveyors, which elevate it to the bunkers.

The construction of the storage bunker on the north side of the plant is quite different, for its shape and size were determined by the space available between the wall of the power station and the embankment. The far side of the bin, which has a 45-deg. slope, is built like a mat on the excavated earth of the embankment while the bottom rests on a strata of rock. Since the building wall, constructed of stone and mortar and designed to support only a compression load, had to be utilized as one side of the bin, further reinforcement against the lateral forces had to be provided. This was done by supporting the wall at eight points with buttresses which extended through the wall and onto the boiler room floor for a distance of 7 ft. at their base. The upper end of each buttress is secured to the wall of the bin with tie rods, while the actual weight of the wall is transferred to the building wall by means of concrete dowels. This bin has an average depth of about 30 ft. and is not subdivided.

REINFORCED-CONCRETE BIN FOR STORING COAL UNDER WATER AT EAST END OF TWIN CITY POWER PLANT

The loaded cars can be dumped directly in the north bin from a track which extends along the station wall. It is an extension of the spur which goes over the main receiving hopper and into which the coal to be conveyed directly to the bunkers is unloaded. The coal is reclaimed by the locomotive crane, which dumps it into the regular receiving hopper. Since the range of the crane is limited, sometimes it must make several operations to transfer the coal up to the hopper located at the northeast corner of the building.

The accompanying view, which shows considerable steaming, was taken during zero weather, when the evidence of such a condition is most pronounced. At that time there was probably as much coal stored above the water line as below owing to the large reserve that had been accumulated. This, of course, is an abnormal condition and has the same effect as though the coal were piled on the ground at a height equal to its depth above the water level.

Switch Easements and Frog Standardization

Some Observations Regarding the Difficulty of Specifying Special Trackwork Curves That Will Suit all Conditions

BY S. STRIEZHEFF
Department of Way and Structures
Brooklyn Rapid Transit System

THE fact that the committee on way matters of the American Electric Railway Engineering Association, at its May meeting, took no action with respect to standardization of branch-off frogs spurred the writer to set down a few pertinent observations on frog standardization in particular and of A. E. R. E. A. switch easements in general.

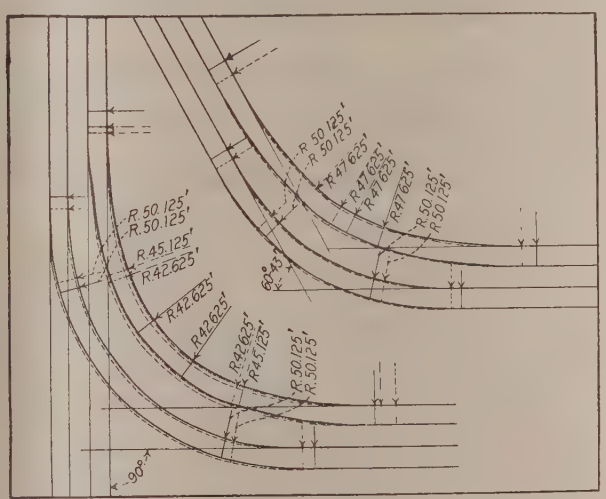
While the idea of possible standardization of frogs is in itself a very good one, the method suggested in Appendix A of the A. E. R. E. A. 1921 report, i.e., the insertion of a "closing" radius between easement and inner radius so as to take care of different gages and devilstrip widths, is inconsistent. It does away entirely with uniform curves, rendering meaningless Appendix C of the same report, as well as the 1920 report with regard to Type A easements. Study of Appendix A demonstrated to the writer the disadvantages of this method of frog standardization and rendered him skeptical as to the advantages stated on page 76 of the report mentioned.

That the alleged saving of 50 per cent in the total number of frogs cannot be realized is evident when we consider the relative amounts of special trackwork purchased during a given time by different street railway companies. For example, take on one hand a large system having a standard gage and practically uniform track centers, and on the other the small units of odd gage and varying track centers running through the boroughs of Squeedonk and Toonerville. In general, why should a large system such as the Brooklyn Rapid Transit, for instance, adapt itself to the physical and pecuniary limitations of the Gopher Prairie single-track transportation units?

The report itself contains the following statement: "In the matter of interchangeability of frogs on any one street railway system having only one distance between track centers, the proposed standardization scheme offers little advantage."

So much for standardization. As to the A. E. R. E. A. easements in general, they present no improvement on easements or spirals in use. The outline of a 200-ft.-radius A. E. R. E. A. Type A switch easement is practically the same as that of Lorain switch spiral No. 3. Even if there were some slight difference it would hardly be worth the effort to secure it. As a way engineer recently said to the writer: "What is the use of all this theorizing in surface road special work? Thirty days after installation all your theory is wiped out!" A prominent American engineer, after his return from service overseas, said that in France they were continually installing curves of plain radius and that the cars going over them would after a while work out a spiral for themselves at each end of curve.

As far as Brooklyn is concerned Appendix C of the 1921 report could just as well never have been included, as it simply does not and cannot suit local conditions. The main feature of this appendix is the insertion of an intervening long radius between the 200-ft. switch



TRACK CURVES OF DIFFERENT DESIGN DRAWN FOR COMPARISON OF A. E. R. E. A. EASEMENT SPIRALS AND THOSE IN GENERAL USE

In both sets of curves A. E. R. E. A. easements at ends of curves are indicated by full lines (as well as the joining central radius curves). Dash lines represent curves of same central radius with Lorain spiral easements at ends.

Dotted line curve in 90-deg. intersection has central radius 2.5 ft. longer than full line curve in same location but approximately same ex-secant due to Lorain spiral easements at ends. Thus, dotted inner curve with dash-line outer curve presents same situation as full line inner and outer curves, both for car clearance and area occupier.

radius and the spiral easement (for greater car clearance), thus increasing the ex-secant and bringing the curve almost onto the sidewalk. This limitation was recognized by the proponents of the appendix and they suggested for Brooklyn the 200-ft. switch easements A, and furnished a set of possible double-track branch-off curves. Unfortunately this was a hybrid solution of the problem, following neither the 1921 Appendix C nor the 1920 A easements, on account of the insertion of the "closing" radius for that much coveted but as yet unrealized frog standardization. Further consideration has caused these suggested curves to be laid aside, at least for the present.

The accompanying diagram shows the lack of advantages in the A. E. R. E. A. easements and also brings out some of their disadvantages. For instance, in the 90-deg. branch-off, the Lorain spiral No. 3, with 150-ft. radius switch, allows for a longer central radius without practically any increase of ex-secant, thus assuring a

longer life to the curve. The entire branch-off, shown in full lines, with 200-ft. radius A. E. R. E. A. switch easements A in the inner curve and 100-ft. radius easements in the outer curve required about 13 ft. of special trackwork more than the inner curve (shown by the dotted line) of longer central radius and the outer curve (shown by the dash line), with Lorain spirals Nos. 3 and 2 respectively. Yet these last two involve the same conditions as far as car clearance and area occupied are concerned.

In conclusion, while the writer sees no advantage in either the Type A switch easement of the 1920 report or in those of Appendix C of the 1921 report, he recognizes the difficulty of the subject of possible frog standardization and admits the great desirability of such standardization. He fails, however, to see how the method suggested in Appendix A can improve matters to any extent.

What's New from the Manufacturers

Transformer Load Indicator

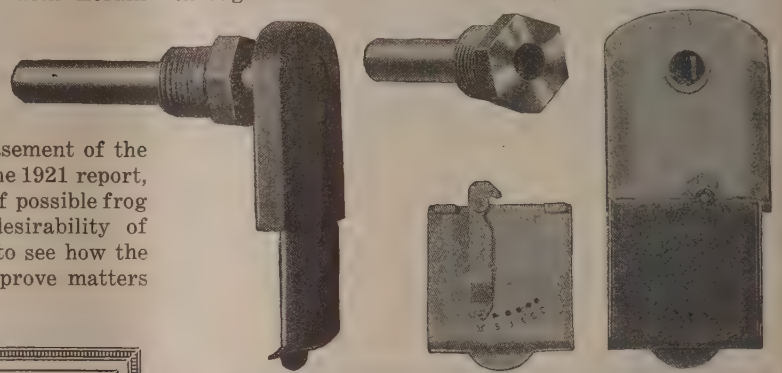
A TRANSFORMER load indicator is being manufactured by the Westinghouse Electric & Manufacturing Company. The indicator is made for mounting in place of the drain plug or, preferably, in the side of the tank wall a few inches below the oil level in a distribution transformer for the purpose of indicating whether any predetermined temperature of the transformer has been reached or exceeded. When the predetermined temperature has been reached, a yellow semaphore, or flag, drops into view to indicate the fact. Since the flag is of a distinctive color, and has an area of about 2½ sq.in., it can be readily seen from the street by a watchman.

The most important use for this device is to indicate when a transformer is overloaded, but it can also be utilized to determine whether transformers operating in a bank or in parallel are properly dividing the load. Underloading can also be detected by setting the indicator to trip at a low temperature, failure to trip at this low temperature being an indication that the transformer is underloaded.

The load indicator consists in general of two parts—the indicating mechanism and the plug. The plug portion replaces the regular transformer drain plug or the special plug now being provided in Westinghouse distribution transformers a few inches below the oil level, and it can be inserted in the transformer tank either in the storeroom or on the line. The pipe is a tube closed at the inner end and enlarged to a standard pipe thread with a hexagonal nut at the outer end. The tube, when in position, is surrounded by the transformer oil.

The indicating mechanism consists of a base plate, tube, bimetallic strip, flag, adjusting rig and cover. The tube fits the inside of the plug and has a threaded piece at the end which engages the nut in the end of the plug. By means of this threaded piece, the indicating mechanism can be inserted in the plug with a turn or two after the transformer is hung and can then assume a vertical position without danger of falling out.

The bimetallic strip is set in the end of the tube while the free end, projecting beyond the end of the base plate, latches the flag in position. The flag is held until, through an increase in temperature, the bimetallic strip



AT LEFT, TRANSFORMER LOAD INDICATOR. AT RIGHT, DISSEMBLED VIEW OF TRANSFORMER LOAD INDICATOR SHOWING YELLOW FLAG IN TRIPPED POSITION AND METHOD OF OBTAINING DIFFERENT TRIP SETTINGS

bends enough to unlatch it; then it drops by gravity. The top of the flag is bent over and, after dropping, engages the bottom of the base plate, which is bent upward. The flag is reset by simply pushing it back in place.

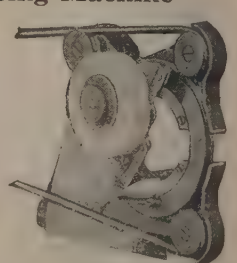
The indicator can be set to trip the semaphore at any predetermined temperature within the range of adjustment by setting the trigger.

The indicator responds to the temperature of the oil in which the plug is immersed, and since the object is to have the signal trip when the hottest part of the winding has reached a temperature of 105 deg. C., it is necessary, in setting the pointer, to allow for the difference between the temperature of the hottest part of the winding and the temperature of the oil at the top or bottom of the tank where the indicator is placed.

For average operating conditions, it will generally be found satisfactory to set the indicator to trip when the oil at the top of the tank reaches a temperature of 80 deg. C. or when that at the bottom of the tank reaches a temperature of 70 deg. C. In setting the indicator, however, consideration should be given to the individual temperature characteristics of the transformer on which the indicator is mounted.

New Armature Coil Taping Machine

THE P. E. Chapman Electrical Works, St. Louis, Mo., has brought out a kickless self-feed armature coil taping machine. It is claimed that this machine takes the "kick" or pull of the tape off the operator, so as to make operation easy. The operator, however, guides the coil and operates the machine in a similar manner to a plain taping machine. The machine has no gears, cams, belts and requires no setting up for a job. The self-feed allows the operator to increase or decrease the lap at will and while running. The machine is claimed to be economical in the quantity of tape used and will make a smooth and neat coil of uniform size.



ARMATURE COIL TAPING MACHINE

Securing the Maximum Benefit from Energy-Saving Devices*

The Author Has Brought Together the Experiences of Twenty Railways Using the Three Types of Devices for Measuring Energy and Power-on and Coasting Times—A Summary of Follow-Up Methods and Figures on Instrument Maintenance Are Presented

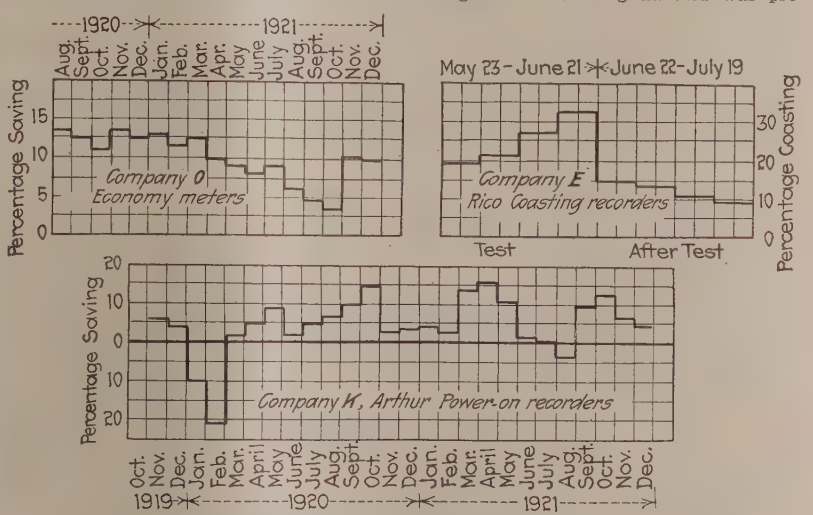
By Frank H. Miller
Vice-President Louisville (Ky.) Railway

THERE are now on the market three power-saving devices that have reached a successful and acceptable state of perfection. These are the Rico coasting recorder, the Arthur power-time recorder and the Economy kilowatt-hour meter. The basic principle and method of operation of each of these devices are well known to all electric railway operators. The number of properties using energy-checking devices of one form or another is sufficient so that considerable data are available on the savings their use has made possible. It is the magnitude and nature of these savings in which we are particularly interested.

This paper is based on information obtained from twenty railways using energy-saving devices. Six of these have installed the Rico coasting recorder, seven the Arthur power-on recorder and seven the Economy meter. All these companies report uniformly that these devices are effective in saving energy, and generally agree that the saving up to a certain point is almost proportional to the amount of time devoted to the instruction and follow-up of the operators of cars equipped with such devices.

A résumé of the outstanding advantages as received in answer to the twenty questionnaires is tabulated in Table I. This table shows the number of meters installed on each property, the date the instruments were placed in service, the advantages of the devices according to the experience of each operating manager, the number of clerical employees required per one hundred devices, the methods used to arouse and stimulate the interest of the platform men and the annual maintenance cost. The great interest of operating men in the subject of power saving is indicated by the complete and valuable information furnished. Many interesting practices were described in the replies and almost every one mentioned other advantages that had accrued from the use of power checking devices besides the main one of energy saving.

For instance Company "A" states that men with a high coasting percentage seldom have an accident. The report of Company "C" shows that both preliminary tests and later experience indicate that a 1 per cent increase in coasting is equivalent to a saving of 1 per cent in energy. Prior to the installation of coasting clocks secret checks of motormen's performance revealed an approximate coasting average of 20 per cent, and following the use of clocks as high as 30 per cent was secured. In regard to the interest taken by the men in energy saving, Company "D" estimates that 15 to 20 per cent of the motormen, especially the "high coasters," actually check their own coasting time daily. The operator of Company "E" made the statement that any device which the motorman knows is accurately checking the energy consumption will be the means of reducing it until a reasonably low value has been reached.



GRAPHS FROM THREE PROPERTIES EACH USING A DIFFERENT ENERGY SAVING DEVICE

The decreased saving of Company "O" during the last half of 1921 was probably due to the increase in passengers per car-mile. Company "K" stated that the variation in the amount of saving was undoubtedly caused by the difference in supervision.

A feature of the coasting recorder is brought out in the statement of Company "F":

> The principal advantage of the coasting recorder as a power saver is that it emphasizes that phase of operation, i.e., coasting, which is one means of saving power. It is, however, subject to the objection that the results have no absolute relation to the kilowatt-hour saving. In one way this is an advantage because it is unnecessary to take into account the characteristics of the motor equipment or of the loading in order to obtain a measure of what has been done by the motormen to save power.

A user of the power-on type of device, Company "G," emphasizes the simplicity of the record keeping system as a distinct advantage:

> We regard any type of power saving device as merely a method of educating motormen. No device, in our opinion, is of any use unless it is carefully followed up. The Arthur power-on recorder permits this follow-up and educational work to be done in a simple and effective manner. Perhaps its most marked advantage is that it permits a simple system of record keeping, since it is not necessary to classify different types of car equipment to any appreciable degree.

In regard to offering prizes this company adds:

> We are strong believers in the need of keeping up the interest of the employees by some sort of prize or bonus system. In the beginning we worked out a scheme which experience has shown to be quite satisfactory. We set a standard on each line for the motormen to work toward. All men who do better than the standard receive a small prize. The man who heads the list on each line receives $5 at the end of each three-month period. The man who takes second place receives $3, and a $2 bonus is given to all others who have done better than the standard. We find it much better to offer a large number of small prizes rather than a few relatively large ones, as more men are kept interested.

Company "H" was pleasantly surprised with the effect of power saving on the life of equipment:

> When we first considered putting on power-time recorders our mechanical department was under the impression that in the efforts to save power the car equipment would suffer. It was gratifying to receive recently a report from our superintendent of rolling-stock and shops entirely justifying our installing these recorders and in which was made the rather broad statement that the improved way in which our rolling-stock was being handled was prolonging the life of car equipment considerably.
>
> We have effected a saving of roughly between 12 and 14 per cent, principally during the last year and a half when working conditions have been improved and we have been able to carry on our power saving campaign more intelligently.

The prize system for encouraging the maximum power saving is employed quite extensively. Company "I" states that a standard "power-on period per hour" for each line is set and all operators coming within this limit are given a premium of $2 a month. Companies "J" and "K" keep up the interest of their platform men by a scheme similar to that of Company "G" except that the prizes are awarded on a six-day week instead of a three-month basis and are of one-half the amount. The motormen of Company "M" are grouped by lines and a weekly list posted in each depot showing their names arranged in the order of their "power-on minutes per month" record. The supervisor of power saving and his outside man are in constant touch with the supervisory force and the

*Abstract of paper presented before the Central Electric Railway Association, June 25-30, on board *S.S. South American*.

TABLE I—INFORMATION FROM VARIOUS ELECTRIC RAILWAYS REGARDING CURRENT-SAVING DEVICES

Company	Type of Device	Number of Instruments	Time of Installation	Advantages of Device	Number of Clerical Employees per 100 Devices	Methods Used to Keep Up Interest	Annual Maintenance per Instrument
A	Rico	1,350	1915–1921	Makes a man "think." Reduces accidents. Checks schedule, equipment and men	1.5	Four instructors who devote all their time to this work	Not stated
B	Rico	369	1917	Unit (minute) used is familiar	1.286	Bulletins, six coasting instructors, individual motormen's records. "Follow up" by official interest	$1.80 first year, $1.76 second year, $6.30 third year, $7.60 fourth year
C	Rico	600	1916	Checks motorman on proper use of power and brakes	.5	Semi-monthly bulletins	$3.40
D	Rico	600	1917–1918	Checks individual operating efficiency of each motorman	1.25	Cash prizes	$6.66. Average of four years $1.50–$2 higher than normal due to strikes of trainmen
E	Rico	348	1913	Moral effect on motorman	2.0	Compliment motormen. Bulletins and published records issued	$10.40 in 1921
F	Rico	201	1911	Emphasizes coasting	1.3	Monthly bulletins giving percentages of various men	$25.00
G	Arthur	1,466	1917–1918	Mechanically and electrically simple. Costs less. Checks faulty brakes and equipment. Records simple	.204	Individual record in pay envelope. Bulletins posted. Number of small cash prizes	$1.80
H	Arthur	1,100	1919–1920	Reduces power consumption. Prolongs equipment life. Promotes more safe operation	.5	Monthly bulletins	$0.50
I	Arthur	34	1920	Records time in minutes for power on. Moral effect on car operator	.3	Monthly prize of $2 to all operators who come within a certain standard	$0.50
J	Arthur	388	1920	Simplicity, low maintenance cost, ease and economy of record keeping	.6	Power-saving inspector. Distribution of cash prizes every six weeks	$0.08 first year
K	Arthur	282	1919–1921	Low first cost. Low cost of maintenance and record keeping	1.0	Cash prizes, and constant supervision by inspectors and foremen	$0.15
L	Arthur	170	1915–1920	Power saving of 10 per cent	.85	Cash prizes and constant instruction	Not stated
M	Arthur	1,400	1920–1922	Permanently accurate, low first cost, reliable, rugged and simple. Units used familiar to trainmen	.57	Weekly bulletins. Close supervision, and fostering of competition and rivalry among men	$2.04
N	Economy Meters	330	1919	Provides means for comparing men, and different types of equipment on the same or different lines	...	Bulletins and instruction to less efficient	$1.02 in 1920. $2.68 in 1921
O	Economy Meters	450	1919–1922	Comparison of men. Checks up equipment	1.0	Semi-monthly bulletins, and "follow-up" instruction	Not stated
P	Economy Meters	106	1920	Operators can observe power consumption, meters are simple, sturdy and reliable. Inspection dials are valuable for car inspection	1.0	Bulletins. Short competitive efforts. Constant supervision and instruction	$1.20
Q	Economy Meters	109	1920	Positive measure of power consumption	1.0	Supervision by power-saving inspector	$2.70
R	Economy Meters	539	1919–1921	Measure saving in units desired. Measures power consumption at car. Inspection dials. Rugged and simple	1.0	Competitive spirit. Bulletins. Constant supervision and interest of officials	$1.44
S	Economy Meters	120	1915–1920	Measures energy consumed at the car	1.0	Weekly bulletins. Constant supervision	$2.90
T	Economy Meters	309	1922	Measures power consumed at the car. Meters simple, sturdy, and reliable. Inspection dials valuable for car inspection	1.0	Semi-monthly bulletins. Supervision by inspector	Installed in 1922

motormen, and keep the matter of power saving a live issue by fostering a desire among the motormen to head the list. The matter of some form of bonus for a high standing is under consideration.

When we come to the reports of railways using Economy meters we find that there is almost no end to the constructive interpretations that can be placed on the actual kilowatt-hour consumption of a car as measured by this type of instrument. Company "N" remarks that the meters are of considerable value in providing comparisons of power consumption of different types of cars or of the same car on different lines. In regard to conducting the power saving phase of car operation this company adds:

Occasional bulletins are posted and the interest of the men is further kept up by sending out lists showing comparative standings. These lists do not show the names of the men but simply the records with a check mark opposite the record of the man receiving it. Those using excessive power are instructed further in the proper method of handling equipment, and those who constantly remain near the top of the list are sent letters of commendation by the general superintendent.

Company "O" finds the principal advantages of Economy meters as follows:

They make it possible to publish a fair relative ranking of motormen for each class of run on each route. The relative ranking, together with the follow-up instruction after the novelty wears off, stimulates the motormen to maintain a standard of economical operation.

The meter detects at once any mechanical defects which increase power consumption, such as tight brakes and defective motor wiring.

TABLE II—PER CENT POWER SAVING OF COMPANY "T" COMPARED WITH BLIND PERIOD

1922 Week Ending	Number of Meters Installed / Blind Period—Weeks	Divisions I (17 / 2)	II (27 / 1)	III (23 / 1)	IV (21 / 1)	V (32 / 1)	VI (69 / 2)
January 30		7.44					
February 6		11.98					
13		12.40					
20		12.80					
27		11.57					
March 6		11.98					
13		11.98					
20		13.22					
27		12.80					
April 3		11.57					
10		10.33					
17		7.02					
24		9.90	12.90				
May 1		9.10	7.60	10.10			
8		10.70	9.12	6.36	11.55		
15		11.60	9.87	8.60	10.13	5.75	
22		10.70	11.40	10.50	14.40	5.14	
29		11.57	9.50	10.80	15.60	5.43	
June 5		9.90	9.50	13.85	15.90	8.75	8.34
12		8.68	9.12	12.35	15.60	9.37	8.04
19		9.50	8.75	11.20	15.3	6.35	8.34

Several additional points are brought out by the statement of Company "P":

> The meters are simple, sturdy and reliable. Operators have faith in their accuracy. They require but little attention and that from an ordinary electrician. Much valuable data can be compiled from the meter readings. By the use of the inspection dials the shop men can see at a glance whether or not the car is due for inspection.

This company keeps up the interest of the men by comparative reports displayed in the train rooms and with inspirational, informative and educational matter printed in the employees' magazine. Occasional special competitive efforts of short duration help maintain discipline. It is their idea to make power saving an incidental but steady part of each man's work.

Among other advantages, the operator of Company "R" mentions that of getting a measurement of energy at a point not otherwise obtainable so that it is possible to segregate definitely the distribution losses. This company also encourages the motormen to report promptly those faults of the car equipment which would increase energy consumption. The manager of the property takes an active personal interest in the correction of these defects and also rides frequently with the motormen to discuss the ways and means of saving power.

The experience of Company "T" with Economy meters is shown in Table II. The meters were first placed on one division for a trial period of two months. After the initial test meters were ordered for the other divisions of the company and were installed at intervals of one or two weeks as indicated in the tabulation. A rather marked difference in the saving from week to week will be noticed. In analyzing these variations it was found that fluctuations in the number of passengers carried materially affected the percentage of energy saving.

Relation of Car Ventilation to Passenger Comfort*

Volume of Air Required for Desired Refreshing Effect Greatly Exceeds That Necessary to Supply Chemical Needs—Exhaust Ventilators with Arch-Type Roof Entirely Practical, Utilizing Leakage as Fresh Air Supply

By W. McK. White
President White Manufacturing Company, Goshen, Ind.

PROPER car ventilation is a vital necessity to every electric railway as one of the factors for securing public good will and increased traffic. To be sure, it is a sanitary problem affecting public health. The era of considering the pleasure and comfort of passengers is at hand. An electric railway cannot sell its service to the best advantage by subjecting its customers to unpleasant surroundings. Executive and transportation officials are constantly reminded of ventilation by popular sentiment, and those in charge of equipment have accorded the subject some investigation. I think, however, that far too many cars are ventilated in a haphazard manner due to many conflicting theories causing car designers and operators as a last resource to take a chance on some simple means, which may produce ventilation, though actually it may be inadequate.

Scientific study has given some data on the proper content of air in steam railroad coaches, on the frequency with which the air must be changed and on the relation between heating and fresh air supply. I am quoting frequently herein from bulletins published by Dr. Thomas R. Crowder, who conducted a number of extensive tests for the Pullman Company. The further these investigations progressed, the more pronounced became his opinion that the question is one of psychology and physics rather than one of chemistry.

The first recorded attempts to study air in railroad cars were made in 1875 by Wolfhugel and Lang. The next inquiries were instituted in 1878 by the Prussian Minister of War to learn the best methods for ventilating hospital cars. In about 1893 the Massachusetts Board of Railway Commissioners had tests made in passenger coaches and at the same time the Pennsylvania Railroad opened the subject. In 1894 the Master Car Builders' Association made an extended report and published analyses of air from sleeping cars, chair cars and suburban coaches. In 1904, Dudley of the Pennsylvania System issued a report on a number of experiments in analyzing air from coaches ventilated by the excellent plan which he devised.

A Problem of Circulation, Not of Air Purity

The results of all these studies show that steam railroad cars with standard exhaust ventilators average a lower carbon-dioxide content than restaurants, offices and stores, and that the main problem is one of circulation, not of air purity. It is not my purpose to include the mathematical data recorded in these tests because they all prove that the necessity for ventilation does not arise from a poisoning of the air by products of respiration. It is rare for the carbon dioxide so produced to contaminate the air of any room, even with the poorest ventilation, to the extent of more than fifty parts in ten thousand, or one-half of one per cent. That amount is entirely harmless. The limit of allowable carbon-dioxide content is variously placed at from ten to fourteen parts in ten thousand and is that degree at which the sense of smell gives indication of closeness to one entering the room. The averages of steam railroad cars with adequate exhaust ventilators were shown to be within this limit, but the average of electric railway cars examined exceeded this ratio.

An interesting series of tests conducted by Dr. Crowder showed the following contents of carbon-dioxide in parts per 10,000:

Sleeping car, lower berths	6.96
Stores	8.80
Steam railroad day coaches	9.38
Elevated railway coaches	13.90
Offices	13.91
Suburban railway cars	14.30
City street cars	15.10
Restaurants	16.10

It is a comparatively simple matter to supply enough sufficiently oxygenated air to any railway car. In fact, the more usual difficulty is encountered in letting too much in. The really important problem is to govern and regulate the air movement within the car. Relatively small amounts of fresh air will supply the chemical needs of the body whereas large amounts may be required to satisfy the physical demands.

To the average person fresh air is that which cools the body. Its so-called freshness depends upon its ability to remove body heat and is not affected by richness in oxygen or absence of poisonous gases. Partially vitiated or devitalized air will not be criticised by passengers if it is stirred up. Of course this statement is not to be construed as an excuse for poor ventilation but is in explanation of the fact that surface absorption is most important in its effect on bodily comfort. Moreover, the simple stirring up of air on a line patronized by "unwashed" passengers is not sufficient to eliminate objectionable odors.

An average adult produces enough heat in about an hour to raise the temperature of 1,000 cu.ft. of air 15 to 20 deg. F. and this heat must be absorbed to keep the person cool and comfortable. If the air is still the effect is depressing. When people crowd together in restricted space they soon overheat the air. Either fresh air must be supplied or the air must be put into motion. It is evident that air movement in a car is more important than its purity and its temperature is more significant than its carbon-dioxide content. Proper renewal assures healthfulness, but this renewal of the interior air must not cause chilling drafts nor "short circuits" in certain parts and the methods for securing this circulation must prevent entrance of dirt, side drafts, rain or snow.

Use of Monitor Roof Proves Need for Ventilation

The use of the monitor roof is an admission of the need for ventilation. It was the first attempt and yet many railways, both steam and electric, retain this primitive means for obtaining good air by the use of deck sash. The deck sash should rapidly be discarded as a car ventilator. Sometimes the open sash permits large volumes of air to enter, often very little. Sometimes it acts as an outlet but offers no as-

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sistance toward removing warmed air from below. When acting as an intake the large opening permits undesirable downward drafts and in stormy weather, when ventilation is most needed, the deck sash must be closed. Thus no dependence can be placed on such ventilation and no railway with such a handicap can sell satisfaction to passengers.

On the other hand, the monitor roof can be readily adapted to give highly efficient ventilation by the installation of a number of exhaust ventilators. This can be done at a moderate expense because standard size ventilators can be obtained and mounted on wood or metal panels to fit in the deck opening. They may be applied to the outside and the sash used to open or close the ventilator aperture. Several well-known electric railways have thus modernized their equipment in this respect. One of these is the Indiana Public Service Corporation. Arthur W. Redderson, superintendent of equipment of that company, states that it was done at a cost of only $10 per car in addition to the cost of the ten ventilators. The satisfactory result is best shown by the popularity of these cars.

There are many railway men who prefer monitor roof cars either because of personal preference or to harmonize with railway standard design. On new equipment the exhaust ventilators can be used advantageously and there are several successful ventilators for such application. No superintendent of equipment need consider the selection of any one of them a life and death matter.

Arch-Roof Construction Dependent on Exhaust Ventilators

Effective ventilators have made the arch-roof car possible. In other words, arch-roof cars would be exceedingly unsatisfactory were it not for successful car ventilators. It takes no argument to prove this because a short ride in an arch-roof car with ventilators closed soon gives adequate demonstration. The importance of ventilating an arch-roof car requires that an efficient eductive car ventilator should be applied. But let me caution you that a hole in the roof, with protection against rain and no assurance of exhaust action, is not sufficient.

Prior to the perfection of storm proof ventilators it was always thought necessary to install regulators and this is still a general custom. I believe, however, that a regulator or register is not always necessary or advisable. Careful scrutiny shows that usually these registers are closed and thus the good provisions for ventilation are made useless. Control of ventilation is thus transferred to whims of conductors and passengers.

If a car is equipped with sufficient ventilators for average or nearly maximum traffic and heating apparatus of properly related capacity is installed, it is far better to omit controlling mechanism. There are several exhaust ventilators which will not admit rain or aid winds and consequently do not have to be closed in stormy weather. Even in cold climates this plan is followed. The Milwaukee Electric Railway & Light Company, Milwaukee, Wis., was one of the first properties to omit registers and that city has exceedingly cold winters. The Chicago Surface Lines was one of the early users of exhaust ventilators without control.

I have frequently used the term "exhaust ventilators" and may explain this in approaching the matter of intakes, by stating my conviction that exhaust ventilators are the most satisfactory. Due to car construction and the physical action of warmed air in rising, it is necessary to withdraw this air in proximity to the roof. I further believe that you cannot take air into and out of a car at the same place without causing short circuits of air currents and with no assurance that the incoming air will have time to drop into the breathing zone before being withdrawn. That such short circuiting does take place was shown in tests, where by actual measure some 80,000 cu.ft. of air per hour was leaving a car through the exhaust, although carbon dioxide computations showed only 40,000 cu.ft. being supplied to the breathing zone.

Undoubtedly the ideal plan for car ventilation embodies a properly arranged system of intakes, preferably with distributing ducts. Frequently car construction complicates such a layout. For many years those seeking adequate ventilation depended upon leakage for supply of outside air. We now have metal sash, weather strips, storm windows and tight construction to decrease leakage, but steam railroad tests indicate that in the tightest cars the crevices still provide adequate intake.

Dr. Crowder measured 30,000 cu.ft. per hour passing out through the ventilator duct of a small stateroom with door and windows tightly closed so that the air must have found its entrance through crevices. Pettenkofer showed that when all visible chinks in a room were closed, the rate of ventilation was decreased only 28 per cent as compared with the rate when doors were closed in an ordinary way. There is no difficulty with an open fireplace draft when a room is closed, though each pound of fuel consumed causes some 2,600 cu.ft. of air to pass up the flue. Few inclosures are so fully provided with crevices as a railway car and subjected to such high wind velocities and pressure. With an average of some 500 lineal feet of crevices only 0.01 in. wide, over 20,000 cu.ft. of air could enter in an hour.

If this leakage is not too great it is a satisfactory intake as the air quickly mixes with warm currents from the heaters. The doors of cars in city service are opened frequently but on interurban cars either leakage or designed intakes must balance the action of the ventilators. Those heating systems which circulate warmed air meet this requirement but are usually installed on city cars only, perhaps because they supply heated fresh air on one side only.

I do not know of any instance of air intakes with distributing ducts of both sides of an interurban car using hot water heat. The Pennsylvania Railroad has used a system similar to this for several years on all-steel coaches, but these coaches can be supplied with large quantities of steam, whereas on an interurban car the water has to circulate in limited pipeage. It must not be cooled near the entrance to the passenger compartment so much as to withdraw its heat and leave only cold water in the pipes on one side of the car.

Air Leakage Sufficient on Interurbans

Consequently the air intake problem on interurban cars is still awaiting solution. My feeling is that leakage must take care of these cars, if not overdone, and will be adequate because there is less crowding on them and they require a higher degree of maintained temperature. It would be inadvisable to establish the practice followed on steam coaches and sleeping cars of dropping the end-door windows, because the draft would be unheated and too direct on those sitting in the rear. Furthermore, whenever the car is stopped the area of low pressure in the rear of the moving car, which tends to withdraw air from the body, is equalized and causes a strong inrush of air from the rear toward the front.

The requirements of a good ventilator are efficiency, protection against storm and side winds and ease of application. There are a number of accepted types, usually either round, box, honeycomb or ejector, and their producers have been diligent in experimentation in the laboratory and in service to increase their efficiency. They have given deep study and have spent large sums in endeavoring to solve the question of proper ventilation. In their behalf I must say that this work has sometimes been rendered difficult due to deep-seated opinions held by operating men who would defend their individual ideas rather than accept the experience of ventilating engineers delving into this problem.

I feel that little hesitancy need be had in accepting many of the well-known car ventilators on the market. They are designed so that the movement of the car produces a partial vacuum in the passage to the car body and considerable volumes of air can be withdrawn. One series of tests showed the following capacities in cubic feet per hour per ventilator:

At 5 miles per hour	5,700 cu.ft.
10 miles per hour	10,900 cu.ft.
20 miles per hour	20,200 cu.ft.
30 miles per hour	31,700 cu.ft.
40 miles per hour	41,300 cu.ft.
50 miles per hour	52,700 cu.ft.
60 miles per hour	64,200 cu.ft.

Another type showed 4,600 cu.ft. per hour at 5 m.p.h.; 16,900 at 10 m.p.h.;

34,300 at 20 m.p.h. and 54,300 at 35 m.p.h. Another type suitable for steam or interurban coaches registered as high as 99,000 cu.ft. per hour at 60 m.p.h. Velocity tests showed that air was withdrawn at a speed very nearly half that of the car. These figures were laboratory tests and in service experiments it was found that a reduction of 30 per cent would accurately represent their capacities. Much computing has been done on the amount of air which should be moved through a car and the simplest figure mentioned is 2,000 cu.ft. of air per person per hour. This happens to coincide with the amount necessary to carry off the hourly production of heat generated by the average adult and will maintain the requisite chemical purity.

The necessity for protection against the elements is apparent and the approved types of ventilators are arranged to prevent ingress of water. This is accomplished by baffle plates which hardly interfere with the air movement.

Admitting that car ventilation is desirable and required, it is evident from results obtained that present exhaust ventilators are entirely able to meet the demands of hygiene. But the success of car ventilation depends far more on supplying conditions suited to the outside of the body than to the inside of the lungs.

Gear Economies Through New Tooth Shapes*

Advantages of Long Addendum Pinions Possible Without Gear Changes with New "Wisdom Tooth"—Oversize Pinion Developed for Mating with Partially Worn Gears

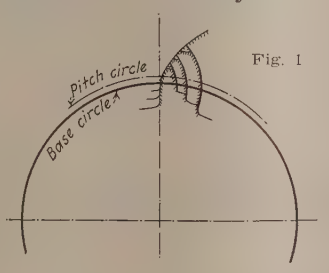
By E. S. SAWTELLE
Assistant General Manager Tool Steel Gear & Pinion Company, Cincinnati, Ohio

FOR a long time stress has been laid almost exclusively on the development of quality of the steel used in railway gears, but in recent years more emphasis has been laid on tooth shape and the possibility of better gearing through design. Any proper design in tooth shape will give satisfactory service when new, but we must concern ourselves mostly with what happens when a partially worn condition is encountered. Until recently practically all railway gears had the Brown & Sharpe 14½ deg. standard tooth, excellent for smooth operation, with a full depth and therefore more wearing surface than the stub tooth, comparatively straight sided and therefore with minimum tendency for the gear and pinion to push apart. This tooth is a general standard easily interchangeable and almost universally used for industrial machinery. The chief objection to it was the fact that pinions with a small number of teeth were undercut in the flank, that is, the tooth was thin and liable to break near its root; also there was a tendency for this undercut condition to accentuate as the pinions wore. The first improvement used in the railway field was the 20 deg. stub, a tooth shorter in depth, therefore giving less breakage leverage, and having more slanting sides, therefore giving a broader base. This tooth has much strength and because of its lesser depth the pinion is strengthened somewhat against bursting, particularly where the bore is large and the pinion small. It was adopted as standard some years ago on the lines of the Interborough Rapid Transit Company, and numerous other lines with similar service.

The next development was the long and short addendum tooth, a type of gearing that for years has been used extensively in European countries, particularly Germany and Switzerland, and has been used for many years in bevel and automotive gear in America. Its application to the railway field was delayed primarily because it lacked interchangeability with old standards. This type of tooth is usually made with a 20 deg. angle which broadens the base and increases the strength. Further than this, by shifting the addendum, the pinion tooth, usually the weaker member of the train, is very decidedly strengthened and this is done without weakening the gear. By making the pinion oversize in diameter there is a gain in the amount of metal between the root of the tooth and the bore, which helps against bursting on thin pinions. This type of tooth when cut full depth shows rather thin at the top of the pinion tooth and as a remedy for this the tooth is sometimes stubbed. The stubbing process removes metal that would otherwise be worn away in service, hence has a tendency to decrease the life of the pinion, but it makes a more pleasing appearance.

To understand the signficance of the long and short addendum tooth, we will need to go slightly into theory. The involute curve is the base of practically all of our modern gearing as it represents the ideal curve of tooth contact when two gears are in mesh. Fig. 1 shows three left hand involutes generated from the same base. The section between the right and the left hand involute is a gear tooth, needing only the top trimmed off and the bottom shaped up to continue into adjacent teeth. The farther apart the involutes, the coarser the pitch and the less number of teeth in a gear of any fixed diameter. The full involute, however, is too long for practical use so a section is taken out of it for the individual gear tooth. If this section is close to the base line (Fig. 9), we have practically the straight sided tooth of very low pressure angle, used where there must be no thrust away between the gear and pinion. Coming up higher on the curve (B) we have the 1½ deg. pressure angle heretofore standard. Higher up (C) we have the 20 deg. tooth and to illustrate by an extreme case (D) we could build a gear with about a 30 deg. tooth and yet one that would have perfectly smooth action though of course with very heavy thrust and giving no service at all when considerably worn or used with bad bearings. High pressure angles therefore mean forming a tooth on the upper part of the involute curve, farther removed from the base circle. In a gear with many teeth slight changes in pressure angle are hardly measurable, but in a pinion with few teeth they are decidely noticeable.

Standard depth of tooth is purely an arbitary dimension. In Fig. 3 we have the full involute which runs to a point at the top. We first decide the pres-



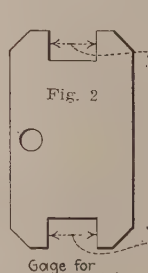
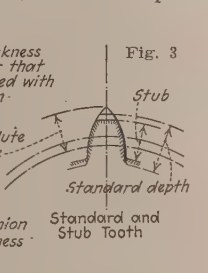
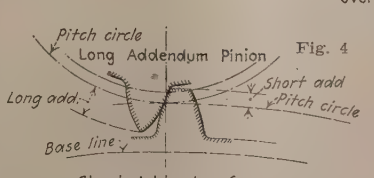


Fig. 2
Maximum thickness for worn gear that can be matched with oversize pinion
Standard pinion tooth thickness
Gage for Oversized Pinion





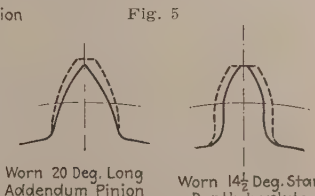


FIG. 1—AN ILLUSTRATION OF HOW HEAVY AND LIGHT PITCHES CAN BE DEVELOPED ON THE SAME BASE CIRCLE. FIG. 2—GAGE USED WITH OVERSIZED PINIONS. FIG. 3—THE PRESSURE ANGLE DESIRED DETERMINES THE LOCATION OF THE PITCH CIRCLE. FIG. 4—LONG ADDENDUM PINION AND SHORT ADDENDUM GEAR. FIG. 5—EVEN WHEN WORN OUT THE LONG ADDENDUM PINION (LEFT) IS STRONG AT THE BASE

*Abstract of paper presented before the Central Electric Railway Association, June 25-30, on board the *S.S. South American*.

sure angle we will use, this determining how high up we shall go on the involute curve to locate our pitch line. If we take a comparatively long section above and below this line, we have the full depth standard tooth. If we take a lesser section above and below, we have the stub tooth. If we take a greater section above the pitch line than we take below the pitch line, we have a long addendum pinion and when we build the gear to match it we must make it with a correspondingly short addendum.

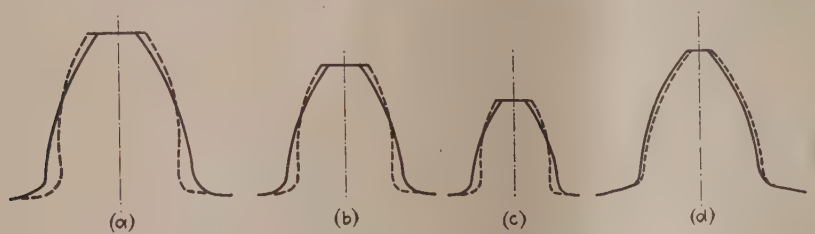


FIG. 6—CONTRAST OF WISDOM (HEAVY LINE) AND STANDARD TOOTH CONTOURS. ALL WISDOM TOOTH PINIONS HAVING ONE MORE TOOTH THAN THE STANDARD FOR THE SAME PITCH

(a) Interurban railway type; (b) city railway type; (c) safety car type; (d) identical shapes of 20-deg. long and short addendum and wisdom tooth.

In standard gearing the relative size of the tooth and slot is the same on each member. In long addendum gearing (Fig. 4) the teeth are made much longer on the pinion and project further beyond the pitch diameter On the gear the slot is deepened proportionately. Likewise on the gear mating with this pinion, the tooth projection is shortened and the slot in the pinion is correspondingly shallow. The amount of diversion in extra length and depth is optional with the manufacturer and he can build around any formula he desires. The longer the addendum on the pinion the more pointed it will be at the top of the tooth. The illustration in Fig. 4 takes an extreme lengthening of the pinion addendum to make the contrast between long addendum and standard gearing the more noticeable.

The long addendum pinion is preferable to the standard for the reason that it is a stronger pinion at the base, a thicker or "fatter" pinion at the pitch line and will in actual service permit twice as much steel being worn off the side of the tooth before rejection as is permissible with the standard 14½ deg. shape. This is illustrated in Fig. 5. When worn out, it is still a strong tooth at the base, whereas the old shape tends to wear to a weak tooth. This means that if a long addendum pinion and a standard pinion of equal quality are operating under identical service, the long addendum pinion, because of its tooth shape, will give approximately twice as much life. The gears running with these pinions will have about equal durability, in fact, only by accurate measurement can you distinguish between the short addendum and standard gear teeth form. There is no question whatever as to the desirability of the long addendum pinion for any service where gears and pinions are to be completely worn out before discarding. The only drawback is the seriousness of changing over from the old standard to the new.

The "wisdom tooth" pinion was recently brought out to overcome this difficulty* and to present to the operating man a practical opportunity for realizing all the advantages of long and short addendum gearing without going to any radical change or heavy expenditures. The "wisdom tooth" pinion (Fig. 6) is in every way a long addendum pinion and partakes of all the advantages of a long addendum pinion. It is, however, so designed and generated that it can be operated with the standard Brown & Sharpe 14½ deg. gear. Hence it can be installed without any gear change and the operator can go over to the true form of long and short addendum gearing with all its advantages by merely renewing pinions with those of the "wisdom tooth" shape. There is no dark secret about this shape; it is a pure involute generation of a standard tooth on an oversized diameter blank. Its use, however, involves one slight change, that is a slight reduction in the ratio as one tooth is dropped out of the pinion in forming the "wisdom tooth" shape. The changes in speed and acceleration caused by the different ratio are so little noticed that cars equipped with "wisdom teeth" are running on the same schedule as cars with standard pinions and even in one case are running in multiple-unit trains interchangeably. In another instance "wisdom tooth" pinions have been put on motors on one end of the car and standard pinions on the other with reports from the mechanical department that this gives thoroughly satisfactory service. Especially on pinions with a small number of teeth, such as the 13-tooth pinion standard for the safety car, the "wisdom tooth" idea gives a tremendously increased tooth strength. This has proved of great value to many users of safety cars who have been experiencing excessive breakage from the standard 13-tooth pinion. To illustrate the close similarity between the "wisdom tooth" shape and the standard long addendum pinion shape, Fig. 6 (a) shows the one superimposed on the other.

"Wisdom tooth" pinions have now been sold to 44 different operating companies and their use has run to a total of 1,886 pinions. Thus far there has not been an adverse criticism. The oldest pinions have been in service longer than the life averaged from the standard pinions and still are only one-third worn out. In several cases they have completely stopped what was otherwise serious breakage trouble.

*See *Electric Railway Journal*, June 17, page 972.

OVERSIZE PINION FOR MATING WITH WORM GEARS

A still further innovation being successfully used is the application of the "oversize" pinion of either standard, wisdom tooth, or long addendum design. This again is purely a practical problem. When your automobile cylinder and piston rings become slightly worn, you replace them with new oversize piston rings. Likewise, when a gear is badly worn, it can be mated with a pinion having thicker teeth than the normal standard. This takes out the major part of the backlash and uses up the old gear under much better operating conditions than normal. At the same time the oversize pinion, having thicker teeth at the start, has more material than can be worn off the teeth before they are reduced to the scrapping point. The teeth being thicker are stronger at the root, both when

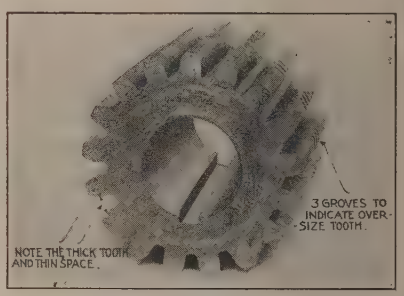


FIG. 8—OVERSIZE PINION FOR MATING WITH A WORN GEAR

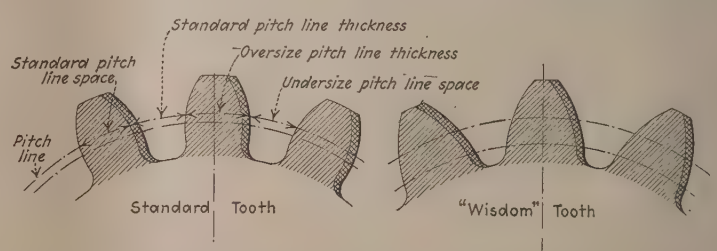


FIG. 7—CONTOURS OF OVERSIZE PINIONS HAVING A TOOTH WIDTH AT THE PITCH LINE LARGER THAN THE SPACE

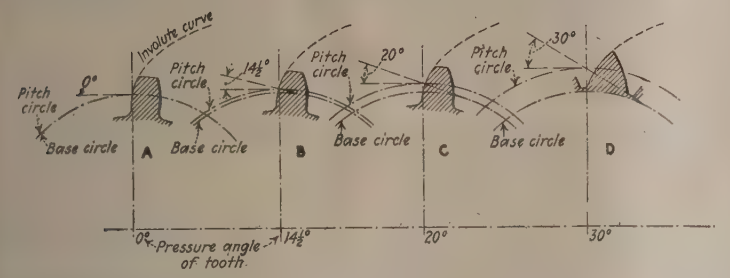


FIG. 9—TOOTH SHAPES OF THE SAME PITCH, SHOWING THE INCREASE IN THE PRESSURE ANGLE BY WORKING HIGHER ON THE INVOLUTE CURVE

new and when worn out. The advantages therefore are longer pinion wear, stronger pinions, and less backlash. The only disadvantage is the necessity of care not to mesh oversize pinions with unworn gears. This is guarded against by special markings of three grooves around the periphery of the pinion, illustrated in Fig. 9, and by using a wear gage which must go down over the gear tooth before it is worn sufficiently to take the oversize pinion. We believe the advantages more than overcome the disadvantages and where the shop organization can accommodate itself to the use of the oversize pinion, it will be found a decided saving in cost per thousand miles and its wear will greatly improve the operating conditions as regards noise, vibration, etc.

John Fritz Medal Awarded

THE board of award of the John Fritz Medal made the nineteenth award of this medal on July 8 at the United Engineering Societies' Building in New York City. The recipient was Senator Guglielmo Marconi, to whom the medal was given for his invention of wireless telegraphy. This medal was established to recognize achievements in applied sciences, and the board awarding it consists of representatives of the "founder societies," i. e., the A.S.C.E., A.I.M. & M.E., A.S.M.E. and A.I.E.E. Among previous recipients of the medal are John Fritz, Lord Kelvin, George Westinghouse, Thomas A. Edison, Elihu Thomson, Gen. George W. Goethals, Sir Robert A. Hadfield and others equally distinguished.

Technical Societies of Boston Affiliate

THE mechanical, electrical, mining and metallurgical, civil, ventilating and other engineering organizations of Boston have formed "The Affiliated Technical Societies of Boston," with headquarters at 715 Tremont Temple. In the first issue of the bulletin of the organization a list of objects and functions is given. The fundamental purpose, of course, is to co-ordinate the technical society activities, prevent duplication and promote the welfare of all engineers in the community. The various functions are to be carried out through the office of an executive secretary, under the direction of a council and the executive committee. There are at present nine member societies. One of the most useful functions promises to be a comprehensive employment service.

Well-Known Railway Men to Address Safety Council

A STRONG program has been arranged for the session of the electric railway section of the National Safety Council, which will hold its annual meeting in Detroit from Aug. 28 to Sept. 1. During the five-day session several joint meetings of the electric railway and public utilities sections will be held. A partial list of speakers before the electric railway section was given in the issue of this paper for July 8. The complete list of topics and speakers, given below, shows that all except one of the speakers are executives in the electric railway field:

A paper on "Safety as an Operating Factor," by F. R. Coates, president Community Traction Company, Toledo, Ohio; a paper on "The Human Side of Our Business," by Britton I. Budd, president Chicago Elevated Railroads and Chicago, North Shore & Milwaukee Railroad, Chicago; a paper on "The Most Efficient Manner of Conducting Safety Work," by Charles B. Scott, general manager Bureau of Safety, Chicago; a paper on "The Financial Side of Accident Prevention," by Garrett T. Seely, vice-president and general manager Pennsylvania-Ohio Electric Company, Youngstown, Ohio; and a paper by Arthur W. Brady, president Union Traction Company of Indiana, Anderson, Ind.

Safety Code Approved by A. E. S. C.

THE American Engineering Standards Committee, by letter ballot, has approved the National Electrical Safety Code of the Bureau of Standards which covers the generation, distribution and utilization of electricity for power, light and communication. The Standards Committee announces that there is now in process of formation a thoroughly representative sectional committee to consider any revisions of Part 2 of this Code, "Rules for the Installation and Maintenance of Overhead and Underground Electrical Supply and Signal Lines," which may be deemed necessary by any of the interested parties. There are also being organized three sub-committees to take up the unification of crossing specifications under the three following heads: Signal lines crossing railways; power lines crossing railways; and power lines crossing signal lines.

These committees are being organized in conformity with the action of the March 2 conference on the standardization of crossing specifications at which there were present the representatives of fourteen national, engineering, utility and industrial associations, four departments of the federal government, various state commissions of Connecticut, Iowa, Minnesota, New York, and of the telephone, telegraph and cable companies.

American Association News

Trackless Transportation

A MEETING of the American Association committee on trackless transportation was held at association headquarters on July 7. Those present were: H. B. Flowers, Baltimore, chairman; H. B. Potter, Boston, vice-chairman; W. J. Flickinger and R. E. Danforth.

The committee drew up its report in final form, which was made in three parts. The first is to cover the policies that the committee recommends as to bus operation. Then follows the report of the Transportation & Traffic Association's committee on the places where buses can be operated to advantage. Next come the vehicle designs suggested by the Engineering Association committee.

In conclusion the committee is to urge further study of the subject of trackless transportation during the ensuing year.

Revisions of the Engineering Manual Distributed

J. W. WELSH, of the American Association, has sent out, to all persons and companies entitled to receive them, sets of revised or added sections of the Engineering Manual.

To facilitate the rehabilitation of existing copies of the Manual, a set of instructions for inserting these sections has been distributed. It is hoped by this means to overcome one of the greatest difficulties in keeping the Manuals up to date, namely, the substitution of new material for old, and the addition of new sections at the proper points to permit them to be readily found by means of the index.

Inclosed with the Manual sections was a revised copper wire table, and sent out at the same time, a poster to cover an incorrect table appearing on page 452 of the 1921 Engineering Association Proceedings.

News of the Electric Railways

FINANCIAL AND CORPORATE :: TRAFFIC AND TRANSPORTATION
PERSONAL MENTION

Chicago Votes to Strike

Trainmen of Surface Lines Insist that Present Contract Be Renewed for a Year

Complete tieup of local transportation facilities faces the city of Chicago. This was indicated on July 10 when the trainmen's union of the Chicago Surface Lines voted 12,149 to 37 in favor of a strike if their demand is not met for a renewal of the present contract for one year. At the same time employees of the elevated lines announced, after rejection of a similar demand by President Budd, that they would vote on July 13 to decide whether they would stand with the trainmen of the surface lines in the event of a walkout.

It was expected that International President Mahon would be called to Chicago before making the strike effective. This suggested the probability of further conferences with the officials of both companies with a view to getting together on a compromise wage cut or arbitration.

President Blair's proposal was for a wage reduction of 25 per cent for trainmen and changes in working conditions which would provide that the percentage of straight runs be reduced from 60 to 40, and the "spread" on swing runs be extended from 14 to 14½ hours and that the time-and-one-half penalty for overtime should not begin till after the ninth hour.

Conductors and motormen have been getting a maximum wage of 80 cents an hour since June 1, 1920, and when the fare was reduced from 8 to 7 cents on June 15 the management announced that expenses would have to be cut accordingly. President Blair said the revenue might be decreased as much as $9,000,000 a year, depending on what percentage of tickets would be used at the rate of three for 20 cents. The number has already reached 42 per cent and it is thought it may go as high as 80 per cent.

Union men at the meeting scorned the suggestion of a 20 per cent cut and adopted a resolution authorizing their officers to call for an immediate strike vote unless the company would agree to a renewal of the present contract for another year. President Blair in making his proposal stipulated that the new rates would be retroactive to July 2 and should continue for one year "unless there be a change by competent authority during said one year period in the fare rates authorized to be charged." Other help are to be cut.

Two days later when the union officials called on Mr. Blair they were told that it would be impossible to keep up the present rate of pay as demanded by the men. Mr. Blair said:

> If the men you represent are of the opinion that our proposition of June 30, 1922, asks the men to assume more than their fair share of the reduction in our rates of fare, we will give careful consideration to any counter proposal which may be made on behalf of the men; and if, unfortunately, we cannot come to amicable adjustment we stand ready to refer our differences to arbitration.

Union officials said they had no authority to consider anything but a promise to renew the existing scale and they would have to proceed with the strike vote which was set for July 10. They were quoted by the newspapers as blaming Mayor Thompson and his lawyers for playing politics with the Surface Lines and letting other utilities alone. It was pointed out that the Illinois Commerce Commission, which is said to be friendly to the city administration, had suggested that a fair rate of pay for the men would be about 60 cents and the city lawyers had urged changes in working conditions.

On July 8 Mayor Thompson made public copies of a letter which he had addressed to the state board of arbitration suggesting that they take the situation in hand so as to prevent a tieup of transportation. It was stated that neither the company nor the men would look with favor on this board to prevent trouble. Rumors were abroad that in the event of trouble the city would endeavor to take over the lines and that if necessary the Governor would use State troops to move the cars.

Elevated Employees Threaten Railway

Decision of the elevated employees to take a strike vote was announced on July 10 after President Budd had informed a committee that he would be unable to meet the demands. He said:

> Changes in rates of fare and wages on the elevated are inevitable in the near future. A reasonable revision of wages is necessary, and it should be brought about without inconvenience to the public, which has generously and without protest paid higher fares during the period of high prices. Wage readjustments in the electric railway industry began more than a year ago and in practically every large city in the United States, except Chicago, wages have been lowered, in many instances more than once. I strongly advise our employees against pursuing a course inimical to the public interest.
>
> Suspension of local transportation service in Chicago can have only one result. It will turn public sentiment against the employees, and we are servants of the public dependent upon its continued good will. With the good will of the public behind you there is, in my opinion, no probability of your being called upon to work for wages not commensurate with the character of the service rendered and the living conditions which obtain. Our companies have not profited by the higher fare. On the contrary the net earnings have been less, due to the increased cost of operation.

Mr. Budd also indicated that he would be pleased to continue negotiations.

The local city administration is attacked in a statement addressed to the public by officers of the local Amalgamated. Ridicule is rained on the traction experts for the city, not one of whom, say the union officers, lays claim to any street railway experience on the witness stand. Of the Mayor this is said:

> Now the Mayor wants arbitration by another state commission. His commerce commission hasn't succeeded in splitting the electric railway employees' organization in Chicago, as the motive to isolate the street car men in a wage cut contemplated. Now he wants another state commission to finish the job.
>
> How can any plan of arbitration settle the matter while the administration and its commerce commission are steadily moving for more wage cuts?
>
> If the plan of the city hall to establish 5-cent fares were carried out, and wage cuts followed on the basis of the present one, the train men would receive 20 cents an hour and other employees would have their wages wiped out entirely.
>
> If the car men and their families are to carry the load of the unreasonable political propaganda fare movement of the city administration, then the issue may as well be fought out now as at any other time.

Wage Scale Agreed On—Strike Ends

The strike which became effective on June 1 on the lines of the Mauch Chunk & Lehighton Transit Company, Mauch Chunk, Pa., was terminated on June 24, when a wage scale was agreed on amounting to 41 cents an hour for motormen and conductors. The old rate was 43¾ cents an hour. All other employees were reduced in the same ratio. With this reduction and other economies in operating expense the company which recently took over the railway hopes to put the road on a paying basis.

The line has not been a paying concern for a long time, and the directors decided for the best interests of all to sell the property. Negotiations were carried on for some time and it was sold to a New York syndicate, the members of which were to take over the road and operate it on June 1, 1922. The yearly wage and working agreement of the employees terminated on the same day. About May 16, the employees wanted a new agreement signed, but they were told that the old company could not act for the new company and that they would have to wait.

On May 11 the employees held a meeting and decided to quit work. At 3.30 on the morning of June 1, before the new owners had a chance to operate the road, the committee representing the employees called up the general manager on the telephone and notified him that the men would not work unless the new agreement was signed. The management and employees had a number of meetings, but could not agree. The new management then told the men it could not pay present wages as the receipts would not allow them, and suggested a lower rate. The men would not accept a reduction. Subsequent meetings resulted in an amicable agreement.

Service Being Restored in Buffalo

July 10 Marked Operation of First Car Since Strike There—This Was in Accordance with Promise of Mitten Management—Work of Rebuilding Entire Operating Force Well Under Way

WIRE-SCREENED cars guarded by motorcycle policemen and uniformed police in automobiles have been operated over several of the local lines of the International Railway, Buffalo, since 6 a.m., July 10, but no attempt has been made by the company to operate interurban cars on the Lockport, Niagara Falls or Lancaster divisions since the strike of platform men went into effect at midnight on July 1.

Very little disorder accompanied the running of cars. The police supplied

CAR PROTECTED BY SCREENS BEING OPERATED IN BUFFALO

the necessary protection. The company appealed for the state militia, but it was told that guardsmen would not be sent to Buffalo unless the situation grew so serious that the local police could not handle it. Practically no passengers were carried by the cars operated by the company.

Each screened car is preceded by mounted policemen, motorcycle police and state troopers and is followed by an automobile carrying half a dozen members of the police riot squad equipped with sawed off shot guns. Two traffic supervisors of the International and four trainmen ride on each car. The new platform men have been brought to Buffalo as experienced crews from other cities.

Power house employees and practically all of the shop and track workers employed by the International are remaining loyal to the company.

CORRESPONDENCE PRODUCED IN EVIDENCE

Correspondence between Thomas E. Mitten, chairman of the board of directors of the railway, and W. D. Mahon, president of the Amalgamated Association, showing the existence of an understanding between the company and its employees covering working conditions for 1922 has been produced by the railway as a move to end the srtike.

Mayor Schwab had told Herbert G. Tulley, president of the International, that he would order the men back to work within twenty-four hours if the company would produce evidence of an understanding covering working conditions for the year. When confronted with the correspondence the Mayor insisted the evidence was insufficient and refused to intervene. The Mitten Management, Inc., then issued a statement which appeared in the newspapers as a strike bulletin, placing the blame for the continuance of the strike squarely upon the Mayor.

STRIKERS HAD UNTIL JULY 10 TO RETURN

Several times in the course of the past week the International has called upon the strikers to return to work under the terms of the understanding between Mr. Mitten and Mr. Mahon and it announced that those who did not report for work by phone or in person before midnight July 10 would lose their seniority rights as new employees will be engaged to operate the cars.

Efforts on the part of William Weatherwax, formerly superintendent of the traction lines in Chicago under Mr. Mitten, to bring about a settlement of the strike also failed.

Little was accomplished by the municipal authorities in their efforts to bring about resumption of service by appealing to the Public Service Commission in Albany for an order directing the International to resume adequate service and applying to the Supreme Court of Erie County for a temporary receivership for the International.

Only men with six months' experience in the operation of street cars will be allowed to run cars on the city lines of the International, Mayor Schwab informed the company. He also issued an order directing that all men brought from other cities by the company to operate cars or patrol its property should be finger printed and photographed by the police and their records thoroughly investigated so as to avoid all possibility of trouble.

The Frontier Metal Trades Association, Buffalo, has issued a statement commending the attitude of the International on the open shop question and said that the closed shop is not a matter for arbitration. The association places at the disposal of the officers of the International its co-operation and assistance in maintaining the open shop principle.

While other Buffalo and Niagara Falls newspapers are for the most part remaining silent regarding the issues at stake in the strike, the Buffalo *Commercial* is loyally supporting the International in first page editorials featured daily. A few days ago the *Commercial* said:

> The *Commercial* confesses that it is at a total loss to understand what the striking employees of the International want. What are the men striking for anyway? Certainly it is not for more wages. We have it further upon the authority of Mr. Mahon and Mr. Conroy of the Amalgamated that the issue of the closed shop is not involved. They declare this is no fight against the open shop; that the International will be as free to employ men without the union as within.
>
> Now the men say they want recognition for the union. That is a new demand. But what does it amount to? The most perfect organization for bargaining over wages and conditions is to be found in the Mitten co-operative plan with the unit of labor represented in company employees.

Herbert G. Tulley, president of the International, in a statement to the men says:

> Those re-employed by the company after midnight July 10 will be rated as new men with a new seniority based on the time of re-employment. The bitterest aftermath of this strike will be experienced by the men who lose their seniority rights. You should carefully consider what your own best interest requires of you at this time. Regrets of tomorrow will not return to you this opportunity of today to sign up and keep your run.
>
> Experienced and trustworthy men have asked for this opportunity and will be given permanent places in filling these vacancies. Your choice is, therefore, now or never in so far as retaining your present seniority rights is concerned.
>
> The Mitten Co-operative Plan, which includes collective bargaining, will hereafter govern, and the maximum wage rate for permanent trainmen will be continued at 55 cents an hour for at least a year.

HANDLING TRAFFIC IN BUFFALO BEFORE SERVICE WAS RESUMED

Highest Standards Upheld by Prospective Utility Advertising Association

Steps are now being taken which have for their object the formation of a Public Utility Advertising Association, which may eventually become a distinct department of the Associated Advertising Clubs of the World. An organization committee, headed by W. P. Strandborg, vice-president of the Associated Advertising Clubs of the World and publicity agent of the Portland Railway, Light & Power Company, Portland, Ore., was selected in June at the Milwaukee Conference of the Associated Advertising Clubs of the World.

The new organization will be open to the advertising sections of the American Electric Railway Association, National Electric Light Association, American Gas Association, American Telephone & Telegraph Company and the Independent Telephone Association, as well as to the various state committees on public utility information and individual companies engaged in serving the public with electric railway, gas, electric light and power and telephone service. Permanent organization is to be effected at the convention of the American Electric Railway Association in Chicago the first week in October.

Purposes and objects of the new organization as set forth in a tentative "Standards of Practice" to be submitted at the next meeting follow:

Realizing our obligation and responsibility to the public, to the seller of advertising service, the advertising agent and our own organization, we, as general advertisers, pledge ourselves as follows:

1. To consider the interests of the public foremost, and particularly that portion thereof which we serve.
2. To claim no more, but if anything a little less, in our advertising than we can deliver.
3. To refrain from statements in our advertising which, through actual misrepresentation, through ambiguity or through incompleteness, are likely to be misleading to the public, or unjust to competitors.
4. To use every possible means not only in our own individual advertising, but by association and co-operation, to increase the public's confidence in advertised statements.
5. To refrain from attacking competitors in our advertising.
6. To refrain from imposing upon the seller of advertising service unjust, unreasonable and unnecessarily irksome requirements.
7. To furnish to publishers, when requested, technical information which will help them keep reading pages and advertising columns free from misstatements.
8. To refrain from and discourage deceptive or coercive methods in securing free advertising, and to do everything possible to aid the publisher to keep his columns free and independent.
9. To require standards for ourselves equal to those we set for others.

Meetings Continue on Reorganization Plan

W. Kesley Schoepf, president; Walter Draper, vice-president of the Cincinnati (Ohio) Traction Company, and Attorney Robert A. Taft, representing the Cincinnati (Ohio) Street Railway, attended the second meeting of the citizens' committee which has been named by Mayor George P. Carrel to solve the electric railway problem in Cincinnati. Mr. Schoepf went into detail on the history of the Cincinnati Street Railway and Cincinnati Traction Company and the effect of the double liability clause in the Ohio constitution on corporations. He stated that the Cincinnati Traction Company had been formed under the corporation laws of Ohio with a paid up capitalization of $2,000,000. At the same time the Union Traction Company of New Jersey was organized to finance the company. He recalled the repeal by a vote of the people of the double liability clause and the subsequent dissolution of the New Jersey corporation. Mr. Schoepf stated further that the Ohio Traction Company, successor to the Union Traction Company, controls only the Cincinnati Traction Company, the Traction Building, the Cincinnati Car Company and the Millcreek Valley lines.

Walter Draper, vice-president of the Cincinnati Traction Company, answering questions by members of the committee on the purchase of new cars explained that car trust certificates made it possible to pay off the cost of the new cars over a period of ten years.

At the conclusion of the meeting Mr. Schoepf declared that when the committee started going deeply into the traction investigation he would insist on the committee meetings being executive. The reorganization plan was referred to previously.

Favorable and Unfavorable Comment on New Franchise

The effort of the Louisville (Ky.) Railway for a new franchise agreement and compromise with the city in the fare rate is favored generally by business interests, the various clubs and civic organizations. The City Council, however, is objecting to the ordinance on the ground that the claimed valuation of $10,000,000 is too high. The matter has been placed in the hands of a committee. A digest of the franchise was given in the *Electric Railway Journal*, issue of July 1.

Charter for Kansas Interurban Line

The Arkansas City-Winfield Railway has been chartered with a capital of $300,000 to operate an electric interurban line between Arkansas City and Winfield, Kan. The line, now in operation is about 15 miles in length.

George Theiss, president of the Arkansas Valley Interurban, is working out plans for a connection between his line and the Arkansas City-Winfield line. The Arkansas Valley Interurban now operates a line from Wichita to Hutchinson and another to Newton. Electrification of lines leased from steam lines will connect Newton with McPherson and Salina. Negotiations on this electrification have been going on between Mr. Theiss and heads of the steam lines involved. If the connection is made between Wichita and Winfield there would be electric transportation connection between Salina at the most northern point and Arkansas City at the southmost point or a distance of approximately 125 miles.

Zoology for Railway Men

Zoology is intimately related to electric railway operation, so it turns out. It may be that a lot of operators are already in on the secret, but it is safe to say that most of them never stopped to consider the relation between the two. This was the case with H. R. Miller, efficiency engineer for the Keokuk (Ia.) Electric Company. He just went along from day to day, never for a moment associating the study of insects with his business until last June. And then the study of insects and their habits was forced upon him, for the district where the Mississippi flows between Illinois and Iowa and Illinois and Missouri was visited by an unusual plague of flitting things. The insects swarmed everywhere. And they stuck wherever they swarmed. The cities on the lower level suffered most, but cities on the bluffs also felt the inconvenience of the pest. In Fort Madison, Ia., the bugs were shoveled up and carted from the streets under the lights every morning.

As stated before, the insects swarmed everywhere. Of course, they ought to have respected the patrons of the street cars, but they didn't. In a number of instances they virtually took possession of the cars. Now you can kill an insect by catching it and squeezing it in the fingers or swatting it with a newspaper or a baseball bat, but none of these means appealed to Mr. Miller as he is of a scientific turn of mind and wanted to rid the cars of the insects without too much pain to the bugs. And then he remembered that the reaction of a ray of light upon the protoplasm of a bug, causing movement of the insect toward the light, depends upon the wave length of the light and is inversely proportional to the wave length. So Mr. Miller hadn't studied illumination or zoology for nothing, after all. He had a conference with A. C. Anderson, street railway superintendent of his company. They had lamp globes dipped red and installed them in a car. That car was free from bugs. The next night, all the cars of the Keokuk system were illuminated in red and have been bugless ever since.

The first lamps installed were too deep a red and caused some discomfort to sensitive passengers. The hue finally adopted is rose, which is not absorbed by palm beach suits or white dresses. This strikes the golden mean between the reactions on humans and on insects.

Passengers vote the idea a godsend. The ultimate origin of it is unknown. It is noticed that the bugs are not attracted by certain red lights in the dancing pavilion of the Keokuk Country Club, but enquiry fails to disclose whether they were placed for that purpose, or merely for decoration. It is believed that the Keokuk installation is the first time the lack of insect reaction to the red end of the spectrum was ever used by a public utility company for the purpose of increasing the comfort of the public it serves.

Edgar E. Clark to Head Transportation Institute

Edgar E. Clark, formerly chairman of the Interstate Commerce Commission, will, it is reported, head the National Transportation Institute, the organization of which is being considered in Washington. An account of the original plan of this Institute was published on page 947 of the issue of this paper for June 10. President Harding has indorsed the plan in a letter to Representative Sidney Anderson of the Joint Congressional Commission on Agricultural Inquiry. The president said:

> The broad and outstanding study of the entire transportation problem is unquestionably a serious national matter—indeed I think I may well say a serious world necessity at this time. Such an organization as you are proposing ought to become a power in connection with the nation-wide consideration of these problems and a useful directing force in connection with the dissemination of public policy.

Senator Cummings of Iowa, chairman of the Senate Interstate Commerce Commission, said nothing was more needed at this time than an organization to ascertain the truth respecting transportation and to disseminate the facts brought out. His remarks were of course presaged on the understanding that the institute would be wholly disinterested in conducting its work.

Letters favorable to the plan have been received from others prominent in national affairs.

Paper Praises Council's Act

The City Council of Toledo, Ohio, was recently made a subject for the praise of the Toledo *Times* because of its stand in the matter of paving charges. The City Council granted Commissioner Cann's request to relieve the Community Traction Company from paving expenses. The *Times* in commenting on this action says that the matter of paving between electric railway tracks is an item of public improvement which is properly chargeable to the taxpayers and should not be paid by the car riders because paving is no longer necessary to street railway operation. The editorial comment in part is as follows

> In granting Commissioner Cann's request, Council is merely assisting him to carry out the wishes of the people expressed when they selected the Milner ordinance over the alternative street car-bus plan. The guiding principle of this ordinance is that the car riders shall pay for precisely what they get, allowing the operators a fixed reasonable return on the capital actually invested.

Elec-trac News Makes Début

The Paducah *Elec-trac News* has made its début and will come out twice every month with some interesting information on Paducah's electric utilities—"What they are doing, what they hope to do, to give Paducah the best possible service." The pamphlet is presented by the officials and employees of the Paducah Electric Company and the Paducah Railway. As announced the paper is designed with a two-fold purpose. It aims to stimulate the spirit of co-operation, loyalty and efficiency in service and to disseminate real news concerning the men engaged in Paducah's municipal activities.

The aim of the pamphlet to stimulate loyalty is carried out in the first issue, which contains a picture and write-up of Elec-trac "Bill," formerly known as N. H. Bethel, who has been in the service of the Paducah Railway since 1883.

Working Agreement Renewed

Trainmen of the Ontario Hydro-Electric Commission operating in Windsor have accepted the commission's offer to renew the working agreement. Recently, the commission informed the men that a wage cut of 5 cents an hour was to be made. The men replied that a cut would mean a suspension of service or an application to the Dominion Government for a Board of Conciliation. The men's request for 10 cents additional for the operators of one-man cars and trackless trolleys has been rejected.

Action on Paving Petition Deferred

A public hearing was recently held on the petition of the Charleston (S. C.) Consolidated Railway & Lighting Company that its franchise be modified so as it would be relieved from unfair paving obligations. All who addressed the meeting were in favor of the petition. However, the committee of the whole adopted Alderman Sinkler's motion that final action be deferred until the August meeting of the City Council. The request of the railway was referred to in detail in the *Electric Railway Journal*, issue of June 3.

Milwaukee Purchase Proposal Making Progress

Martin Glaser, engineering and statistical expert for the street railway acquisition committee at Milwaukee, Wis., plans to confer in New York shortly with officials of the North American Company, holding company for the Milwaukee Electric Railway & Light Company.

Fred S. Hunt, chairman of the committee, is reported to have said:

> We have agreed on one thing—the basis for valuation. This will be the 1914 valuation of the Railroad Commission, plus additions. The company insisted on replacement value of its property and the committee held out for the historical value, or actual cost to the company. These figures were about the same, however, so far as the 1914 properties.
>
> One of the intricate problems before the committee is whether we shall agree on too high a value for the property and then insist on a small rate of return or hold the property down to a low value and permit a higher return.

More Buses for Baltimore.—The Baltimore (Md.) Transit Company, affiliated with the United Railways & Electric Company, planned to put into operation on July 15 a complete fleet of twenty-six Republic Knight-motored buses.

News Notes

Arbitrators Are Selected.—Attorney Frank F. Dinsmore has been selected as arbitrator for the Cincinnati (Ohio) Traction Company and Attorney J. H. Vahey of Boston, Mass., has been selected as arbitrator for the Street Car Men's Union to seek an adjustment of the wage question and working conditions proposed in the new contract between the two organizations. The two arbitrators have until July 20 to agree on an impartial chairman. If they fail to agree then the State Industrial Commission will make the selection.

Treasurer Stockwell Suffers Loss.—Mrs. Laura A. Stockwell, wife of Fred F. Stockwell, of the Barbour-Stockwell Company and treasurer of the New England Street Railway Club, died on June 29 after an illness of three days, at the Sylvester Hospital in Allerton. Mrs. Stockwell was almost as well known to the women of New England as is Mr. Stockwell among the men. She was a member of Ramona Rebekah Lodge and of the Eastern Star. She was born in Chelsea, Maine. She leaves her husband and four children.

Cut in Wages Announced.—A new contract has been made between the management of the Inter-City Terminal Railway, North Little Rock, Ark., and twenty-five of its employees. An announcement to this effect was recently made by P. C. Warren, manager of the company. Under the terms of the new agreement the men will receive 3 cents an hour less than they did under the terms of the old contract. The new wage scale is 38 to 40 cents an hour and the old scale was 41 to 43 cents an hour. Younger men in seniority in the service receive the lower pay. The contract is for a year and is dated from July 1.

Fights for Car Line Space.—The Toronto Transportation Commission failed in the attempt to induce the Board of Control of Toronto to interfere with the sub-dividing of the Nordheimer estate. The trustees of this estate have been forming plans to divide the huge estate in building lots and offering the lots for sale. The commission wanted to have a street 80 ft. wide cut through the property so that car lines could be built through the estate. The members of the Board of Control are of the opinion that the cost to the city would be excessive. Commissioner Harris, the spokesman of the commission, in the attempt to get the Board of Control to take over the strip in the Nordheimer estate, thinks the cost will be $1,000,000 to start with, and there will be about $700,000 necessary for improvements.

Financial and Corporate

New Company Ready

Springfield-Troy Railway Authorized to Issue Bonds—Chamber of Commerce Indorses Plan

Final details for the taking over by the newly-organized Springfield-Troy (Ohio) Railway of the properties of the Springfield Terminal Railway & Power Company, including the Springfield, Troy & Piqua traction line, will be completed before the option on the property expires on July 16, according to an announcement made by officials of the new company. The new company expects to exercise its right of purchase under the option on July 15.

It is the aim of the new company to furnish passenger and freight service through use of gasoline-propelled cars, as well as to supply electricity to municipalities along its lines. The company will not produce the electric power itself, but will purchase it from the Springfield Light, Heat & Power Company with whom tentative details of a contract have already been arranged.

Officers of the new company are: C. G. Taylor, president and general manager, Norwalk, Ohio; Henry H. Durr, first vice-president; B. F. Kaufman, second vice-president; D. A. Glover, secretary and treasurer. Directors are: Henry H. Durr, Springfield; A. J. Bright, Christiansburg; B. F. Kaufman, Springfield; A. D. Bowen, Elyria; Henry Pauley, Troy; D. A. Glover, Elyria; C. G. Taylor, Norwalk, and L. F. Bowell, fiscal agent.

CO-OPERATION PLEDGED

The State Public Utilities Commission has authorized the company to issue first mortgage 7 per cent gold bonds in the sum of $250,000, of which $200,000 is to be outstanding, and common stock to the amount of $250,000. The bond issue will be secured by first mortgage on all of the property of the company which has an approximate valuation of $400,000. Representatives of the new company are meeting with marked success in securing subscriptions to the stock and bond issues, as well as pledges of co-operation on the part of manufacturers in Springfield and other points touched by the line.

The Springfield, Troy & Piqua Company went into the hands of a receiver about two years ago. For some time after the receivership was authorized, the receiver attempted to operate the line, but financial results were such that service was abandoned about fourteen months ago. Since then, only a shuttle car operating between the plant of the Victor Rubber Company at Maitland, and Springfield, for the benefit of the Victor employees has been in service.

Residents along the line expressed themselves as being willing to back a reorganization by buying bonds and such a move was attempted about four months ago, but the deal fell through. After an investigation of the possibilities of the section traversed by the traction line, the new company was formed. The proposal is being given the active support of the Chamber of Commerce.

Track Removal Ordered—City Wants to Pave

Removal of the tracks of the Saginaw-Bay City Railway, Saginaw, Mich., from the streets was ordered by the Council on July 11 in a formal resolution instructing the City Attorney to obtain permission from the United States District Court for permission to proceed with the work. The company has not operated cars since it went into bankruptcy on Aug. 10, 1921. The company's franchise was forfeited by the Council on Oct. 21, 1921, on the grounds that it had failed to fulfill its contract with the city and on March 25, 1922, an ouster ordinance was passed, calling upon the company to remove its tracks and overhead construction from the streets within ninety days. Now the City Council wants to do paving along certain streets and permission will be asked of the United States District Judge to remove the tracks or cover them over as the city deems best for its paving program.

American Water Works Company Expanding

Plans for the expansion of the system of the American Water Works & Electric Company, Inc., Pittsburgh, Pa., through the acquisition of the Monongahela Power & Railway Company and the Potomac Public Service Company have about been completed, it is announced, adding approximately $8,250,000 in annual gross earnings to the company.

Of this amount approximately $6,000,000 will be contributed by the Monongahela property and $2,250,000 by the Potomac Company. This will bring total gross earnings of the system up to approximately $28,000,000 annually. The acquisition of these two properties will extend the system of the American Water Works & Electric Company well into West Virginia and Maryland.

The statement of the American Water Works & Electric Company, Inc., and subsidiary companies, including the West Penn Company, for the month of May, shows gross operating earnings of $1,641,914, an increase of $19,053 over the corresponding month of 1921; net earnings of $544,904, an increase of $72,641; gross income $609,088, an increase of $73,782; net income, after all charges, $91,069, an increase of $15,185.

Conversion Plan Only Partially Successful

The plan of the United Railways & Electric Company, Baltimore, Md., to permit owners of first mortage 4 per cent bonds maturing in 1949 to increase the interest thereon to 6 per cent upon the payment of $250 for each $1,000 bond, proved only partially successful. It is estimated that about $3,000,000 of bonds were so deposited.

For reasons which are more or less difficult to discuss, say Nelson, Cook & Company, local bankers, there seemed to exist an antipathy in the public mind against the acceptance of this proposition. One of the objections was the opinion frequently expressed that the proposal should have come directly from the company itself instead of through a bankers' committee.

The bankers contend that this certainly did not constitute a valid objection to a plain business proposition. The future alone, they say, will prove whether or not the holder of the 4 per cent bond who paid $250 and converted it into a bond bearing 6 per cent interest, bettered his position. They are of the opinion that the future will show that he did. In commenting on the position of the company the bankers said:

> The payments received from bondholders who deposited their bonds, together with funds already in hand and available for these purposes, will probably place in the company's hands the funds really required to retire all the notes due on Aug. 15.
>
> It has been reported in the press that the United Railways will indulge in further financing. This may or may not prove correct, although we understand the matter has the consideration of the board of directors.
>
> As stated above, the company is in possession of all the funds needed to meet the maturities of the 5 per cent and 6 per cent notes due on Aug. 15. At the same time, considerable sums have been expended in improvement, equipment, etc., which are actually capital expenditures. Therefore, it may not be amiss, in view of these maturing securities and the release of such a large sum of money for reinvestment at this time, for the company to come into the market and definitely finance these capital expenditures, thereby, through the issue of a long time security, placing itself in an unusually strong cash position for some time to come.
>
> Such financing, however, is by no means an assured fact as we understand the matter is simply under advisement.

The plan for conversion was the subject of editorial comment in the issue of the *Electric Railway Journal* for July 1, page 2.

Public Auction Sale of Spartanburg Property

George B. Tripp, receiver for the South Carolina Light, Power & Railways Company, Spartanburg, S. C., has announced that all properties of the company are to be sold at public auction at Spartanburg, on July 31, under order of the federal court.

It was announced some time ago that the bondholders of the company were working out a plan whereby a successor company would begin functioning in July of this year. Counsel for the bondholders had appeared before the Federal Court and had submitted details of the proposed reorganization. The details were given in the *Electric Railway Journal*, issue of May 6.

Binghamton Road Organizes Permanently

The permanent organization of the board of directors of the Scranton, Montrose & Binghamton Railroad, Binghamton, N. Y., was effected at a meeting on June 26. The directors named are as follows: H. S. Fleming, New York; Frank L. Fuller, Binghamton, N. Y.; R. W. Day, C. C. Ferber, F. W. Wollerton, W. L. Connell and A. Widdowfield.

H. S. Fleming was elected president; R. W. Day, vice-president and general manager; A. Widdowfield, secretary; F. W. Wollerton, treasurer; J. J. Moffat, assistant treasurer.

The Scranton, Montrose & Binghamton Railroad controls the Binghamton Railway, by stock ownership. Application has been made to the United States Court to take the Binghamton Railway out of receivership.

A high-tension transmission line to Binghamton, N. Y., was recently completed and has been furnishing electric current since Jan. 1 to operate the Binghamton Railway and for commercial lighting in Endicott, New York.

Benton Harbor Property Sold

Control of the Benton Harbor-St. Joseph Railway & Lighting Company has been purchased by the Indiana & Michigan Electric Company, South Bend, Ind., for $1,200,000. This gives the South Bend company control of the electric power distribution to practically all important towns in St. Joseph and Elkhart Counties in Indiana, and Berrien, Cass and St. Joseph Counties in Michigan. The deal also gives the South Bend company control of the interurban lines connecting St. Joseph with Dowagiac and Watervliet, Mich. The company will now further expand by erecting a dam costing $1,000,000 in the St. Joseph River.

Hoboken Line Discontinued

A recent decision of the Board of Public Utility Commissioners of New Jersey has approved the discontinuance of the Washington Street line of the Public Service Railway in Hoboken. The abandonment was authorized, however, with the condition that the West New York line take care of certain traffic. The Public Service Railway agreed to this provision. It was shown that there were only five passengers per car, that jitneys paralleled the line and that the West New York cars covered the same territory. At first Hoboken opposed the abandonment.

Utility Maturities Large for Balance of 1922

The total of public utility issues maturing in the last six months of 1922 amounts to $261,921,600. This figure compares with $211,623,240 in the same period a year ago and $60,729,000 in 1920. Among the large issues is the Union Traction Company of Indiana $4,623,000 first 5 per cent bonds due July 1. The Interborough Rapid Transit Company has $39,199,000 of 8 per cent extended notes due on Sept. 1. Under the agreement between the security holders of the Interborough Rapid Transit and the Manhattan Elevated Railroad these notes will be extended ten years.

Financial News Notes

Service to Be Stopped.—The Sacramento Northern Railroad, Sacramento, Cal., has received permission from the State Railroad Commission to discontinue service to West Sacramento.

Wants to Issue Bonds—Application has been made to the Georgia Railroad Commission by the Valdosta Street Railway for permission to issue $100,000 of 6 per cent bonds, the money to be used to extend the company's lines and to establish recreation parks.

Property in New Hands.—A New York syndicate took over the operation of the Mauch Chunk & Lehighton Transit Company, Mauch Chunk, Pa., on June 1. The new president is Rolland A. Davidson, with offices at 15 Park Row, New York City, and the Secretary is V. M. Wolff.

Railway Issues Approved. — The Board of Public Utility Commissioners of New Jersey recently authorized the Morris County Traction Company, Morristown, N. J., to float an issue of $1,600,000 mortgage bonds, $1,500,000 of preferred stock and $1,179,000 of common stock.

Receivership Ended.—The Northampton Traction Company, Easton, Pa., has passed from the hands of receivers and has been reorganized as The Northampton Transit Company. Chester Snyder, who served as receiver for the company, has been elected president. No other personnel changes were made at the time of the reorganization. The terms of the reorganization were published previously.

Officers Chosen.—Following the purchase of a majority of the stock of the Stark Electric Railroad, Alliance, Ohio, by a syndicate in that community, officers have been elected to head the organization. M. S. Milbourne, has been chosen president, C. Y. Kay, vice-president, William E. Davis, secretary, and S. L. Sturgeon, treasurer. All are residents of Alliance. No changes were made in the other offices.

System on Sound Basis.—In his report of the year Finance Commissioner Ross of the City of Toronto says that the transportation system of the city is on a sound financial basis; that fares charged are sufficient to meet all expenses of operation so citizens need have no fear that they will ever be called upon to shoulder any deficits. In his opinion hydro has saved the citizens of Toronto twice the original investment.

Asks for Receiver.—According to a recent finding of Judge Swartz a receiver will probably be appointed to work out the financial difficulties of the Montgomery Transit Company, Norristown, Pa. The matter came before the attention of the court through the action of J. Rich Grier, Otho Newland and C. S. Newall brought against the railway company, the Norristown Trust Company and the Liberty Title & Trust Company as trustees.

Must Pay State Franchise Tax—In the case of the State of Alabama versus Lee C. Bradley the receiver for the Birmingham Railway, Light & Power Company, a decision of considerable importance to all service corporations in Alabama has been returned by the Supreme Court, to the effect that a corporation, even though it may be operating in the hands of a receiver, must continue to pay the state a franchise tax as levied by the constitution of 1901.

Preferred Stock of Bangor Company Offered.—About $470,000 of 7 per cent cumulative preferred stock Class B, of the Bangor Railway & Electric Company, Bangor, Me., is being offered for subscription at 101 and dividend by Beyer & Small, Portland, Me. The stock is not subject to redemption. The new stock ranks equally with the old issue except that it has no voting power. The proceeds from the sale will be used to purchase new properties and for capital requirements.

Manhattan Deposit Time Extended.—More than 60 per cent of the stock of Manhattan Railway, New York, N. Y., has been deposited or pledged for deposit under Judge Mayer's plan of readjustment of the company's relations with the Interborough Rapid Transit Company according to Alvin W. Krech, chairman of the Manhattan Railway stockholders' protective committee. In giving notice that the committee has extended the time in which further deposits may be made up to and including July 25, 1922, Mr. Krech states that unanimity of action is necessary to effect the plan and that failing this receivership will be inevitable.

Surface Line Valuation Case Closed.—The New York Transit Commission on July 10 closed its hearings on the valuation of the properties of the New York Railways. John H. Madden, valuation expert for the commission, was recalled and re-examined by Judge Shearn as to the methods by which he arrived at his calculations and the various items in the report he had submitted. The commission gave leave to Counsel Reynolds for the railway to file a memorandum. In the case of the hearing of the Third Avenue Railway, set for July 10, an adjournment was ordered for two weeks owing to the illness of counsel for that company.

Traffic and Transportation

329 per Cent Overload

Municipally Operated Line on Staten Island Has Frightful Service Record

Case No. 2656. Hearing of June 20. General Lincoln C. Andrews, chief executive officer of the New York Transit Commission, presiding. Solemnly announced: In the matter of the hearing on the motion of the commission upon the regulations, practices, equipment, appliances and service of the Staten Island Midland Railway and of Mortimer Brenner and Grover Whalen, as receiver and operator.

The appearances are noted. The newspaper men present yawn a yawn of despair and prepare for their daily snooze. It is a warm day. Moreover, it has been a long while since the sessions of the commission have provoked any real copy. Enthusiasm is at the zero hour.

Edward A. Roberts is duly sworn. After considerable questioning the fact is brought out that Mr. Roberts is chief of the transit bureau of the commission. Yes, Mr. Roberts is fairly familiar with the lines of the Staten Island Midland Railway. It is established that the road is being run by the city of New York under the direction of the head of the Department of Plant and Structures. Mr. Roberts knows that one of the lines runs from Port Richmond to a point near Eckstein's brewery. Just how near to the brewery is not brought out. Evidently it doesn't matter now, although it might have been different a few years ago.

Captain Cooke, if the commission please, would incorporate into the record the commission's standard of street railway operation. Of course the commission is pleased. As if this were not enough Mr. Roberts specifies the four principal elements of service: (1) cars must run at regular intervals; (2) the cars must be comfortable; (3) the speed should be the maximum consistent with safety; (4) the cars should operate at intervals sufficiently frequent to serve the best interests of passengers. Mr. Roberts is dismissed.

F. G. Daniel is called. He confesses to holding the position of assistant electrical engineer with the commission. There doesn't appear to be any direct reference in what Mr. Daniel said of any knowledge on his part of Eckstein's brewery, but he did know a lot about the physical condition of the line. According to Mr. Daniel there is nothing to prevent the company from giving good service except the physical condition of the road, and that was terrible. Mr. Daniel said this just casual like. The reader should note it carefully. It is going to loom up later in large letters.

William H. Freeman called. He has been with the commission fourteen years as a railway engineer. "Have you," asked Mr. Cooke, assistant counsel for the commission, in addressing Mr. Freeman, "at the request of the commission made or had made under your supervision an inspection of the rolling stock of the Staten Island Midland Railway?" He had. And this is what he found: A total of eighty-one cars, thirty-three of which were out of service. Of twenty-six of the single-truck safety cars examined on May 31 the percentage of those that needed repairs was:

	Per Cent.
Painting	65
Destination signs dirty	100
Cars with broken glass	50
Curtains missing	34
Hand brakes stiff	23
Air gage glass or hand missing	23
Sand box pipe missing	23
Air gage out of adjustment	15
Doors and steps out of adjustment	23
Seats broken	12

Fifteen of the double-truck closed cars were examined and a list of needed repairs and percentages of cars on the same basis as the safety cars is given below:

	Per Cent.
Line switch inoperative	100
Curtains missing	27
Journal boxes worn	47
Glass broken	53
Platforms sagging	60
Destination signs dirty	60
Doors and steps out of adjustment	20
Brake rigging worn	20

June 22. Hearing continued. W. O. Smith the witness. Mr. Smith, it appears, is supervising inspector in the transit bureau of the commission. Charts, tabulations and other figures presented in evidence. What do they show? Well, for one thing, that operation of this municipal line is always irregular, but particularly so during the non-rush hours. It appears also to be a chronic case of excess of passengers over seats. "Compared with standards of proper operation," asks Counsel Cooke of Mr. Smith, "what would you say as to the showing made by these counts?" "They show," said Mr. Smith, "the service is inadequate in both morning and evening rush hours and during twenty-nine non-rush hour periods."

At another point Mr. Smith said that the overload on the Richmond line varied from a trifling one to as high as 329 per cent. This was in the morning rush. In the evening rush the overload at one period was 234 per cent.

July 6. Hearing continued. Harry S. Fischer, statistician for the commission, the principal witness. Basing his testimony on the company's reports, Mr. Fischer said that from Dec. 1, 1920, to March 21, 1922, the company showed a deficit of $400.72. While the general balance sheet showed a surplus of $4,806.37 as of June 30, 1921, he said, a net debit adjustment charged after that date left the deficit mentioned on March 21, 1922.

For the ten months' period ending April 30, 1922, said Mr. Fisher, the total operating revenue was $334,640 and the total operating expenses $311,228, which, with deduction for taxes of $14,445, left a total income for street railway operation of $8,966. There was a non-operating income of $824, making a gross income of $9,790, from which $9,745 for interest was deducted, leaving a net corporate income of $45 for these ten months.

Such in brief is the record made by the city of New York in running its little road down on Staten Island and as brought out by the New York Transit Commission in its general inquiry into the traction situation under direction from the Governor and the Legislature.

One-Man Car Not to Blame for Accident

J. P. Wadhams, assistant engineer of the Connecticut Public Utilities Commission, has submitted his report on the accident in Meriden on June 18, when a one-man car of the Connecticut Company injured a passenger and two occupants of an automobile and damaged five other automobiles. He believed that the failure of human agencies to perform prescribed duties and not the type of car in use was the cause of the accident. His investigation convinced him that the presence of an additional man would not have prevented the accident. He suggested as a remedy that the company's attention he called to a previous recommendation on instructing motormen in such measures as are necessary to prevent a car getting beyond control. He further suggested the installation of air buttons in all cars, inside a small cabinet plainly marked "air button."

Rerouting Ordinances Passed

After a delay of nearly two years the City Council of Cincinnati recently passed ordinances rerouting twenty-five routes of the Cincinnati (Ohio) Traction Company in the business section of the city. The rerouting plan does not call for the construction of any new track except the installation of a few low curves. The report of the Council committee states that it is apparent that the benefits accruing from the installation of the rerouting plant will be: (1) the speeding up of cars and the rendering of better service and (2) the cutting down of expenses of operation which ultimately will be reflected in lower fares.

The various ordinances passed will become effective within thirty days, unless they are subjected to a referendum. W. Jerome Kuertz, Street Railroad Director, said that the entire rerouting plan will not be put into effect, however, for aproximately three months. It is understood, however, that the routes that will not require special construction will be changed as soon as the thirty days referendum period has expired.

Terre Haute's Toonerville Trolley

Whimsical Description of Special Station Service Written for Local Paper

Terre Haute has a Toonerville trolley. At least that is the way the *Saturday Spectator* of Terre Haute refers whimsically to the line which is run between Union Station and Wabash Avenue by General Manager E. M. Walker of the local company as a special service.

As the *Spectator* sees it, running the car is the least of the duties of the conductor, G. W. Ellis. As the door swings open and you alight from the car at Union Station did you ever notice, says that paper, the little old man who takes your bag and helps you down the steps? If you are heavily laden, old, or have several children with you, he carries your packages into the station and perhaps even helps you check your baggage.

This man, the conductor of the emergency car at Union Station, meets every train that comes in. With a rosebud or a ragged robin in his coat lapel, his cap tilted at a jaunty angle on his white head, and a smile on his face, he welcomes all travelers entering and leaving Union Station.

His car, the emergency car, is switched on a side track, and if a train happens to draw into the station when the regular street cars are not there, Mr. Ellis invites prospective passengers into his car and takes them to town. Before the emergency car was put on travelers often had to wait ten or fifteen minutes for a street car. Now there is always one at the station.

Strangers Appreciate Courtesy

"Some days I never leave the station," said Mr. Ellis. "Others I make as many as five or six trips to town and back. But I'm always busy directing people and helping them with their baggage. If I see a stranger, I go up to him, ask him where he wants to go, and tell him how to get there.

"I pride myself on the fact that no one has yet asked me a question I couldn't answer. I've studied up on Terre Haute and Terre Hauteans and I think I could answer any question that could be asked of me about them.

"I direct people to the hotels, to the stamping mills, the hospitals, the river; tell them who the most influential men are, Terre Haute's chief industry, and a hundred and one other things. But if they talk to me for any length of time, I convince them that Terre Haute is the garden spot of the world. I tell all the good points but fail to mention any drawbacks.

"The park in front of the station gives strangers a good impression of the city right at the start. The women especially always comment on it and admire it.

"If a blind person happens to get off the street car, I always lead him into the station, help him to get his ticket and check his baggage. Or if a mother with several children happens along, I help her get settled. I never let old people carry their baggage. I always take it into the station for them.

"Many of the people take my help as a matter of course. But others comment on it and ask how I happen to do it. Then I tell them about the emergency car and how the traction company wishes to welcome strangers to Terre Haute, not by making them wait for a car to take them to town, but by always having some one there to greet them when they arrive and to help them in every way possible.

"They say that Terre Haute is a friendly city—that they know of no other place in the United States having such a system of welcoming strangers.

"There comes a woman now who looks as if she didn't know exactly where to go. I guess I had better go help her," he said, as he pushed his cap over one ear and started off.

A relieved look spread over the face of the bewildered looking stranger as Mr. Ellis, his own face aglow, stepped up to her, took her bag, and ushered her to the car with as much ceremony as a knight of old would have attended a queen.

Newspapers Indorse Jitney Regulation

Favorable reflection is found in the press of Connecticut just across the border from Rhode Island of the regulation of jitneys in the latter State which went into effect on July 1. All the roads in Connecticut suffered frightfully from the jitney before the recent regulation there, but none of them more so than the lines included in the system of the Shore Line Electric Railway operating to the beaches in both Connecticut and Rhode Island.

A considerable measure of protection came to the company under the Connecticut regulatory act of a year ago. Now similar protection is to be afforded in Rhode Island. The extent to which this is so in Rhode Island was indicated in the *Electric Railway Journal* for July 8, page 63.

The Westerly *Sun* said recently:

> The State Public Utilities Commission did a good thing not only for the trolley cars of this State but the public as well when it abolished practically every jitney and bus route in the State of Rhode Island July 1. Perhaps the sweeping decision to wipe out the jitney cars which run on regular routes will not be final. But the public utilities are going to find out if the trolley business cannot be made a paying one and so conducted that better service may be given, perhaps at reduced costs. The board believes then that the public will see the uselessness of a foolish competition, which in the end will give no one service.

The Norwich *Bulletin and Courier* said:

> What appears to be a determination to give the needed co-operation that will permit the trolley lines to meet the expense of operation, get a reasonable return for the service rendered and to meet the requirements of the public in the way of service is disclosed by the action of the utilities commission in Rhode Island, where the jitneys have been eliminated.
>
> This does away with that unfair competition, and means that the electric lines are to be given a fair chance to meet the transportation requirements of the public. It is of course an attitude which is no more than ought to be expected.
>
> Rhode Island has come to the same conclusion that other states have. It is not a time to drive existing companies to the wall. Improved service is to come from just such methods as are being employed in this state and which are now adopted in Rhode Island and with the unfair competitors eliminated there will be reason in the insistence upon the improvement of the service just as fast as the trolley lines are able through the patronage provided to accomplish it.

Transportation News Notes

Token Passengers Increasing—The number of token passengers on the lines of the Public Service Railway, Newark, N. J., is increasing each month. A little more than half of the people who travel on the cars use tokens.

Reduces Fares Within Albany.—The Schenectady (N. Y.) Railway has made a reduction in fares from 8 cents to 7 cents on its lines which operate over the United Traction Company's tracks in Albany. A recent decision of the Public Service Commission reduced the fares of the United Traction Company.

Lower Fare Ordered.—Following a session of the City Commissioners of St. Augustine, City Manager Masters was instructed to notify the St. Johns Electric Company to reduce its fare from 6 cents to 5 cents. The 6-cent charge was authorized during the war to continue for six months after the declaration of peace.

Emergency Increase Denied.—The Alabama Public Service Commission has refused the application of the Mobile Light & Railroad Company for permission to increase fares from 7 cents to 8 cents. This increase was sought as an emergency measure pending the valuation of the company's property. The valuation matter is now before the commission.

New Line Started.—The Springfield (Mass.) Street Railway on June 5 instituted service on its new line from Carew Street through East Springfield to Berkshire Avenue, on the route to Indian Orchard and Palmer. This line was built last year. It accommodates industrial workers of East Springfield, Indian Orchard and Chicopee Falls. Hourly service is maintained.

Fares Cut in Boulder.—The Boulder (Col.) Street Railway recently announced a reduction in fares averaging 20 per cent. The price of books of twenty rides has been reduced from $1.50 to $1.25. Strips of seven tickets are being sold for 50 cents. The single cash fare remains at 10 cents. C. A. Semrad, general manager of the Western Light & Power Company, operating the local lines, explained that the reductions were made in the hope that they would induce the public to patronize the lines more freely.

Personal Mention

J. A. Greenland Appointed Transportation Superintendent

J. Allan Greenland, who has been general passenger and freight agent of the Indiana Service Corporation, Fort Wayne, Ind., has been appointed superintendent of transportation and traffic. In this capacity his jurisdiction in transportation and traffic matters will extend over the Fort Wayne & Decatur Traction Company and the Fort Wayne, Van Wert & Lima Traction Company, as well as over the Indiana Service Corporation. By his advancement Mr. Greenland fills the vacancy caused by the resignation of R. N. Hemming, who recently became associated with the Railway Audit & Inspection Company as the manager of that company's Detroit office.

Mr. Greenland has been engaged principally in steam and electric railway work since his graduation from Roanoke College, Salem, Va., in 1904. After the completion of a three-year course there, he served for eighteen months in the engineering department of the Lake Shore & Michigan Southern Railway in the development of its lines in eastern Pennsylvania. Temporarily leaving the railroad industry, he was engaged in the general builders and supply business for three years at Roanoke, Va. For the following three years he was connected with the Cleveland & Erie Railway at Girard, Pa., in the traffic and transportation department. Mr. Greenland received his appointment as general passenger and freight agent of the Fort Wayne & Northern Indiana Traction Company in 1911. He has held this position until his new assignment, which became effective on May 15.

Mr. Greenland was born in Clarion, Pa., on Sept. 18, 1881.

Samuel W. McCall an Eastern Massachusetts Trustee

Homer Loring has resigned as chairman of the public board of trustees of the Eastern Massachusetts Street Railway and former Governor Samuel W. McCall has been appointed by Governor Cox of Massachusetts to fill the vacancy. The salary is $5,000 a year.

Arthur G. Wadleigh, who was a member of the board, has been designated as chairman of it. Mr. Wadleigh is a lawyer, formerly city solicitor of Lynn, and a former member of the Massachusetts Legislature, and by the consent of all the attorneys in the case he took the leading part for the communities at the time the fares and districts of the Eastern Massachusetts were investigated by the Public Utilities Department.

The appointment of former Governor McCall was confirmed by the Governor's Council on July 12, the same date that the nomination was made, under a suspension of the rules. He has been a prominent figure in Republican politics for many years, as a member of the Massachusetts Legislature and a member of Congress. Mr. McCall was Governor from 1916 to 1919, when he was succeeded in that office by Calvin Coolidge.

S. L. Vaughn a Modern Manager at Grand Rapids

With the remark that "old-time railroading was not much like the present," S. L. Vaughn, vice-president and recently appointed general manager of the Grand Rapids, Grand Haven & Muskegon Railway, Grand Rapids, Mich., shows that he is a modern of the moderns. He knows present-day

S. L. VAUGHN

methods and has definite ideas concerning future development. He is well qualified to compare the past and the present, for his background is that of "the old days." He combines the past experiences and the advanced ideas into an able solution of present-day problems. Thus works Mr. Vaughn.

Of the various means of approach to the mahogany chair which every dramatist attributes to every executive, Mr. Vaughn chose telegraphy. He learned it while working as baggage man and tie inspector for the Chicago & West Michigan Railroad, and learned it, he says, during his leisure hours. Not only this knowledge of telegraphy but his tenacity and ability put him in the successive positions of telegraph operator at Fremont, agent at Holton, agent at Fremont and commercial agent of the Barryline Steamers at Grand Rapids. All this happened between 1884 and 1902. After opening a city office for the company, he was promoted in 1903 to general freight and passenger agent of the company with offices in Chicago. There he remained until 1906, when he joined the Grand Rapids, Grand Haven & Muskegon Railway, as general accountant. In the following year he was appointed traffic manager to look after the increasing passenger and freight business. In February of this year he was elected vice-president, and in June were heaped upon him the added responsibilities attached to the post of general manager.

More Honors and Work for W. P. Strandborg

W. P. Strandborg, Portland, Ore., is again in the public eye. The publicity and advertising man for the Portland Railway, Light & Power Company has just been chosen to head a committee of the Associated Advertising Clubs of the World, which has under consideration plans for organizing a national association of public utility advertising men. Bill, as he is known to the fraternity, was chosen for this post at the recent annual convention of the Advertising Clubs at Milwaukee. The new body, when organized, will become a new department of that association, of which Bill is a vice-president.

Bill Strandborg has a regular job with the Portland Company under President Franklin T. Griffith, but nobody ever seems to have caught Bill working at it. *Watt's Watt* and the other very successful advertising of the Portland Railway, Light & Power Company appear regularly, but Bill, who writes all of it, never seems to have a hand in it, for like as not he will be in Atlantic City today, in Boston tomorrow and in Cleveland a few days later on. He is one of the greatest globe trotters in the world. When he isn't traveling for his own company, he is being sent somewhere as a delegate by the Portland ad men or the Elks or some other body which signifies goodfellowship. Bill just radiates good fellowship. Even his visiting card is in the form of a folder that advertises the Pacific Northwest and invites you out there among the murmuring pines and the hemlocks.

Bill was born in Ohio and usually worms a ticket home out of Mr. Griffith every year. He took Greeley's advice when a young man and went West, serving on many papers on the coast in all the capacities from reporter to editorial writer and managing editor. When Mr. Griffith assumed the reins at Portland he found himself confronted with the problem of bettering the public relations of the company as one of the first things to be done, and to help him in this work he sought out the writer of the kindly, shrewd and whimsical editorials of the Portland *Telegram* as best qualified for the job and found, as one might expect, that they were being written by a jovial little fat man. As the reader must already have guessed, the formal name of this gentleman on the payroll of the *Evening Telegram* was William P. Strandborg.

Friends, Says P. S. Arkwright of Railways and Automobiles

Automobiles and street railways are not enemies—not even friendly enemies—explains Preston S. Arkwright, president of the Georgia Railway & Power Company, Atlanta, Ga., but the mistaken idea that the two are opponents arises because the service of the two is misunderstood. Mr. Arkwright delivered his opinions on the competition between the two means of transportation in an address, called "Friendly Enemies," before the Atlanta Automobile Association in April. The address has more than a momentary interest.

It would be impossible, he points out, for everybody to operate a private machine, even if he were able, for the streets would be so congested that all private vehicles would have to be ordered from the streets. The legitimate uses for the automobile in the transportation field will be in territory where business would not justify the building of rail lines. Mass transportation, however, states Mr. Arkwright is incapable of being furnished by automobiles. Jitneys pay little property tax and nothing to the cost of pavement, operate at will, and are without obligations of any sort. The street railway, on the other hand, is backed by a responsible operating party, provides a safe means of travel, and bears property taxes and paving taxes, though the original reason for this paving tax has long since passed. The expenses of service have increased in greater ratio than gross receipts. Operation of private automobiles, said Mr. Arkwright, cuts receipts of the street railway, and in Atlanta makes the rate of fare at least one cent higher than it would be were there no automobiles. Such operation, he said also, restricts the ability of the railway company to furnish the quantity and quality of service desired. Mr. Arkwright closed with the repeated admonition: "Don't ever let anybody persuade you that the street railroad is the enemy of the automobile, and I hope you never feel that the automobile is the enemy of the street railroad." His remarks have been reprinted in a pamphlet of seventeen pages.

Mr. Ludwig Auditor at York

Samuel Ludwig, who recently succeeded the late J. J. Landers as auditor of the York Railways, York, Pa., has been continuously connected with this company for twenty years. He began as a clerk in the auditing department and worked his way up to the position of chief clerk. His promotion to assistant auditor under Mr. Landers came as a natural result of his careful study of the principles as well as the practice of accounting. So well did he familiarize himself with the duties of the work of the auditing department that his selection to succeed Mr. Landers, and thus head his department, was the natural termination of two decades of endeavor.

C. E. Fahrney has been made vice-president of the Ottumwa Railway & Light Company, Ottumwa, Iowa. He is also general manager of the company.

C. H. Wales is now electrical engineer of the Olean, Bradford & Salamanca Railway, Olean, N. Y. W. J. Woodcock has been appointed superintendent of power station and S. W. Hardin superintendent of overhead construction.

James E. Lamb has resigned as assistant chief of the bureau of accounts and statistics of the Public Service Commission of Pennsylvania and is now practicing as a certified public accountant as a member of the firm Busher, Lamb & Company, Harrisburg, Pa.

H. R. Roudebush, who has been auditor for the Toledo & Western Railroad, Toledo, Ohio, has been appointed secretary and treasurer of the Community Traction Company, Toledo. David A. Moore was formerly secretary and treasurer. He resigned to engage in private business.

J. I. Mange has been elected president of the Southern New York Power & Railway Corporation, Cooperstown, N. Y. He is president also of the St. Johns Electric Company, St. Augustine, Fla., and a vice-president of the J. G. White Management Corporation and the Eastern Pennsylvania Railways.

F. D. Shoemaker, who for the last three and a half years has been in the service of the Illinois Traction System at the general shops of the company at Decatur, Ill., has resigned, effective July 15, to assume the position of staff engineer of the Texas Company, Railway Division, with headquarters at Chicago, Ill. Before going to I. T. S. Mr. Shoemaker was connected with the old Fort Wayne & Wabash Valley Traction Company and the Fort Wayne & Northern Indiana Traction Company, at Fort Wayne and La Fayette, Ind., respectively.

Charles H. Hubbell, Cleveland Ohio, has announced himself as a candidate for Lieutenant Governor of Ohio at the Democratic primaries on Aug. 8. Mr. Hubbell, now at the head of Charles H. Hubbell & Company, certified public accountants, is well known among utility men, particularly in the Central West. He was formerly secretary of the Texas Power & Light Company and auditor of the Illinois Traction Company. He is against trading stamps, cigar coupons, etc., and says they should be legislated out of existence. Instead of being "liberalized" the provisions of the Volstead act and other prohibition laws, says Mr. Hubbell, should be made more stringent. It is his idea that the State Utilities Commission should not be permitted to allow any utility company a value for rate-making purposes in excess of the amount for which its property appears on the tax duplicate. Moreover, he says that municipal bonds issued for the construction or acquisition of public utilities should be a lien only on such utilities.

Obituary

Lefferts S. Hoffman, general attorney for the Public Service Railway, Newark, N. J., died in May. He was attorney for the Rhode Island Company for some time, and was connected with the United States Rubber Company also, in a legal capacity.

John W. Williamson, assistant superintendent of transportation for the Ohio Valley Electric Railway, Huntington, W. Va., died at his home in Huntington. Mr. Williamson joined the Baltimore & Ohio Railroad in 1893, and later became general freight agent of the Ohio Valley Electric Railway. He was appointed assistant superintendent of transportation in 1918. He was fifty years old.

William Reiser, treasurer of the Electric Bond & Share Company, died recently near Port Jervis, N. Y., while on an automobile trip with his family. He was born in New York City, March 9, 1881. He joined the Electric Bond & Share Company in 1909 and was elected treasurer in 1919. In addition, he was treasurer or assistant treasurer of the companies associated with the Electric Bond & Share Company.

Harvey D. Loveland, member of the California State Railroad Commission, died on June 11 in San Francisco after several weeks illness. Col. Loveland was credited in railroad commission circles with being the dean of public utility commissioners in the United States in point of service. He was first appointed to the California commission in 1907 by Governor Gillett and at once established himself as an authority on transportation problems. He was elected to the commission in November, 1910, and upon the reorganization of that body in 1911 became, under the public utilities act, one of its five members. He was again appointed at the expiration of his term and was reappointed on two occasions thereafter. His present term of six years began Jan. 1, 1921.

M. F. Flatley, master mechanic of the Lackawanna & Wyoming Valley Railroad, Scranton, Pa., died a short time ago. He previously had been master mechanic of the Dayton & Troy Electric Railway and from 1915 to 1917 of the Lebanon shops of the Terre Haute, Indianapolis & Eastern Traction Company. He was associated with the Westinghouse Electric & Manufacturing Company early in his career, and later with the Interborough Rapid Transit Company, New York, as foreman of car equipment of the elevated division. He was foreman of the elevated division of the Brooklyn Rapid Transit Company for four and one-half years. In 1909 he became master mechanic of the Rochester, Syracuse & Eastern Railway, Syracuse, N. Y., joining the Indianapolis Traction Company in 1915.

Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS FOR THE MANUFACTURER, SALESMAN AND PURCHASING AGENT

ROLLING STOCK PURCHASES BUSINESS ANNOUNCEMENTS

Early Electrification of Bombay Railways

Information from the Vice-Consul at Bombay, India, states that the proposed electrification of the Bombay steam railroads will be started immediately and will involve the eventual expenditure of 40,000,000 rupees, all the work to be completed by 1927.

The first step in the project will be the electrification of the Harbor branch of the Great Indian Peninsula Railway. Messrs. Merz and McLellan of London are the consulting engineers in this work. The local chief engineer left a short time ago for England with the complete plans. The requests for bids, it is understood, will be made as soon after his arrival in England as they can be prepared.

The Harbor branch, recently completed, connects Victoria Terminus with the Port Trust Railroad and rejoins the main line of the Great Indian Peninsula Railroad at Kurla, which is located on the southern end of the Island of Salsette, about a mile from the extreme northern end of the Island of Bombay. The branch is about 7 miles long. It is double-tracked as far as Sewri (about half way) and single-tracked from there to Kurla. No equipment has yet been bought for this branch; but it is understood that electric equipment will now be purchased.

The Tata Hydro-electric Power Company will furnish all the power. The total hourly maximum demand on the Harbor branch will be 2,500 kw. No new transmission lines will be necessary, the power being supplied from existing substations.

It is planned to start work on the electrification of the first part within six months. It is to be completed in 1924. The acting consulting engineer has estimated that the Harbor branch is about one-thirteenth the size of the whole project.

The second step will be the electrification of the main line of the G. I. P. Railroad from Victoria Terminus to Kurla. This line now has two tracks and two more are in process of construction as far as Kurla.

This second step will take a total hourly maximum demand of 6,650 kw., which will be provided by two substations of 3,500 kw. each. Bids will be advertised for in about six months.

A third stage will be Kurla to Thana, 14 miles; this will require an additional 3,500 kw. The final stage is from Thana to Kalyan, the extreme limit to which steam suburban lines run now. Kaylan is 34 miles from Bombay. This extension will require 2,000 kw. additional power.

Meanwhile, the Bombay, Baroda & Central India—a two-track line—is to electrify its suburban lines from Colaba Station to Virar, a distance of 38¾ miles. This will complete the electrification of the steam railroad lines for suburban traffic. No decision has been reached on the Port Trust Railroad electrification.

It is understood that the government of India will provide the necessary funds, the Viceroy having guaranteed them at a conference with the railroad agents, the consulting engineer, the governor of Bombay, and the financial secretary. It is known that two offers to supply the capital were made by English banks, but it is believed that an effort will be made to raise all of it in India.

$100,000 to Be Spent in Rehabilitation Work

Approximately $100,000 will be spent in the rehabilitation of the Cincinnati, Georgetown & Portsmouth Railroad and its branch the Felicity & Bethel Railway, when the road is taken over by an organized syndicate. L. G. Van Ness, who is the general manager of the Cincinnati, Lawrenceburg & Aurora Electric Street Railroad, has announced that new equipment will be purchased, including cars, rails and overhead wires. Several new substations will also be added at various points along the line to provide the necessary power supply.

Thirty-four Locomotives for Japan

The Imperial Government Railways of Japan has just placed with the English Electric Company for its Dick Kerr Works at Preston an order for thirty-four complete electric locomotives of the total value of upward of £500,000. This represents the whole requirement of locomotives up to the end of 1923 for those sections of the main line railways which the Japanese Government has decided to electrify at once.

Eight of the locomotives now ordered are for heavy express passenger service. They are of the 2-C-C-2 type. Their weight is approximately 96 tons and they are designed to haul a 415-ton train at a balancing speed of about 60 m.p.h. Each locomotive is equipped with six D. K. 86A motors rated at 306 hp. at 500 volts, the motors being connected in two groups of three in permanent series on a trolley voltage of 1,500 volts. The control equipment is of the standard "English electric" cam-shaft muliple-unit type.

Of the remaining locomotives, nine are for local passenger service and seventeen are for heavy freight service. These twenty-six are all of the B-B type and will weigh approximately 56 tons each. They are equipped with four D. K. 86A motors similar to those on the express passenger locomotives, but in this case the motors will be connected in two pairs in permanent series. Here too the control is the standard "English electric" multiple-unit type. The locomotives for local passenger service are designed to haul a 315-ton train and the freight locomotive a 600-ton train, the balancing speeds being about 55 and 40 m.p.h. respectively.

Short Delivery for Interborough Cars

As announced in these columns in the issue of May 6 the Transit Commission of New York directed the Interborough to order 350 new cars, 100 of them immediately. The company obtained bids at once and has now placed an order with the Pullman Company for 100 new trailer cars, which will provide 5,000 additional seats and help relieve existing congestion.

The bid of the Pullman Company covers car bodies and trucks. The wiring and other installation will be made at the company's shops at 148th Street and Lenox Avenue, to which the commission recently authorized additions of a temporary character to facilitate the equipment work. It is expected that the delivery of car bodies and trucks will begin in November at the rate of five a day and that delivery will be completed in December. If this schedule can be adhered to, the cars, which will be in the shops about three weeks, will all be in service by Christmas.

It is estimated that the new cars will cost the Interborough between $1,875,000 and $2,000,000. A part of the expense will be met out of existing funds of the company and the rest will be met by the issuance of $1,400,000 of car trust certificates, designated as "Interborough Equipment Trust Series A," and bearing interest at the rate of 6 per cent, a plan that has received the approval of the commission. The cost of each car when fully equipped is estimated at between $18,000 and $20,000.

Metal, Coal and Material Prices

Metals—New York	July 11, 1922
Copper, electrolytic, cents per lb.	13.937
Copper wire base, cents per lb.	15.75
Lead, cents per lb.	5.75
Zinc, cents per lb.	5.72
Tin, Straits, cents per lb.	31.25
Bituminous Coal, f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	$6.32
Somerset mine run, Boston, net tons	3.62
Pittsburgh, mine run, Pittsburgh, net tons	....
Franklin, Ill., screenings, Chicago, net tons	....
Central, Ill., screenings, Chicago, net tons	....
Kansas screenings, Kansas City, net tons	3.30
Materials	
Rubber-covered wire, N. Y., cents per lb.	6.25
Weatherproof wire base, N. Y., cents per lb.	15.50
Cement, Chicago net prices, without bags	$2.05
Linseed oil, (5-bbl. lots), N. Y., cents per gal.	91.50
White lead, (100-lb. keg), N. Y., cents per lb.	12.50
Turpentine (bbl. lots), N.Y., per gal.	$1.22

Chicago Testing Fare Boxes

The Chicago Surface Lines is contemplating the installation of Johnson fare boxes on all cars. A trial installation of fifteen motor-driven boxes has been made and a study of their operation and the results obtained is going on. The change in fare to 7 cents with a lower ticket rate has precipitated a more prompt consideration of the purchase of boxes. Hand-operated boxes may be installed to begin with and later be replaced with motor-driven boxes. The company will also substitute metal tokens for the paper tickets now in use.

Development Work Involves Millions of Dollars

Cities Service Company recently announced its approval of plans involving the expenditure of several millions of dollars on the properties of the Ohio Public Service Company, a subsidiary serving the northeastern section of Ohio. The plans approved call for the construction of a 60-mile 130,000-volt steel tower transmission line from Lorain to Mansfield, Ohio, a similar line 55 miles long between Warren, Alliance and Canton, where it will tie in with the system of the American Gas & Electric Company, which now operates a large power plant on the Ohio River.

In addition, the plans provided call for the installation of a 20,000-kw. turbine at the Edgewater plant at Lorain, Ohio, and a new 30,000-kw. turbine in the Toledo Edison Company plant in Toledo. This development work when completed on the Ohio properties at Mansfield, Massillon, Elyria, Lorain and Alliance will make available for service generating capacity now held in reserve in the individual plants. A new 10,000-kw. turbo-generator has been authorized for the Empire District Electric Company in Joplin, Mo., together with other equipment for subsidiary utility properties of Cities Service Company which involves an expenditure of an additional $1,000,000.

$32,500 to Be Spent in Railway Department

The 1922 construction program of the Columbus Electric & Power Company, Columbus, Ga., announced several weeks ago by R. M. Harding, manager, includes the sum of $32,500 to be expended in the electric railway department. Carhouse improvements total $1,500; purchase of three new street cars $20,000 and miscellaneous track work amounts to $11,000.

Great Northern to Electrify

The Great Northern Railway is planning to electrify its system in the Rocky Mountain States, according to reports in the financial district this week.

The Spokane region is to be developed first. The work is expected to start about 1924.

Rolling Stock

Western Ohio Railway, Lima, Ohio, will have its new steel cars which were ordered recently delivered by July 20.

Chicago, Aurora & Elgin Railroad, Aurora, Ill., will shortly place an order for twenty new combination parlor and dining cars.

Department of Street Railways, Detroit, Mich., will open bids July 24 for 100 new cars of the Peter Witt type, 100 pairs of trucks and the necessary electrical equipment for their operation.

Kansas City (Mo.) Railways has been authorized through its receivers to purchase the twenty large type cars under an order filed in Federal Court signed by Judge Kimbrough Stone and Judge Arba S. Van Valkenburgh. The application was made several weeks ago.

Dallas (Tex.) Railway has purchased five one-man cars with two express cars for installation on the Dallas-Terrell interurban line. The cars were constructed by the American Car Company. These one-man interurbans will be the first to appear in the south or southwest.

Jacksonville (Fla.) Traction Company has announced through its manager, J. P. Ingle, that three of the one-man cars had arrived. These cars will take the place of the two-men cars on one of the lines serving the greatest number of people in the city. In all twelve cars have been ordered to be ready for operation the latter part of August.

The Reading Transit & Light Company, Reading, Pa., has secured equipment of sign frames for advertising use on the outside of the cars. The frames, attractive in appearance and made of metal, were finished in the shops of the company at Reading and are of uniform size and color to harmonize with the exterior finish of the cars. Posters are placed in the frames to inform the public along all city and suburban lines of attractions at various places reached by the cars. At present they are used especially for Carsonia Park, where the advertising of free band concerts, dancing, baseball and other diversions has been followed by a large volume of business since the opening of the outdoor amusement season.

Track and Roadway

Olean, Bradford and Salamanca Railway, Bradford, Pa., will start the repairing of pavements along its tracks in all parts of the city.

The Tiffin, Fostoria & Eastern Electric Railway, Tiffin, Ohio, will tear up its street car tracks the entire length of South Washington Street before next April.

The Winona Interurban Railway, Warsaw, Ind., expects to place a contract within the next two weeks for necessary tracks and switches for connecting with the Wabash Railroad at New Paris, Ind.

Chattanooga (Tenn.) Traction Company is planning the extension of its lines which will join the Red Bank and Signal Mountain lines. Making the connection will include the laying of about 2½ miles of track. The investment will amount to approximately $60,000.

Milwaukee Electric Railway & Light Company, Milwaukee, Wis., is engaged in the rebuilding of the track intersection at West Water and Grand Avenues. An entire new intersection will be put in, including a double-track curve at the Caswell Block corner and the removal of the single-track curve at the Gimbel corner. This work will cost about $46,000 and will take one month to complete.

British Columbia Electric Railway, Vancouver, B. C., is relaying 1,000 ft. of track with the paving of a section of Wilson Road, Kerrisdale. This work will cost $16,000. Work has been started on the double-track Broadway west extension of 1 mile from Trafalgar Street to Alma Road. The track will cost $75,000, of which $50,000 will be spent on local labor and materials.

Indianapolis (Ind.) Street Railway has been ordered to extend city street car service to the city limits in College Avenue by the Board of Public Works. Officers of the company pointed out that the company did not own the tracks in College Avenue north of the terminal of present service. The works board in ordering the extension offered no suggestions on means to be employed by the company in acquiring the use of tracks north of that point, which now belong to the Union Traction Company.

San Diego (Cal.) Electric Railway started work on May 22 on the reconstruction of its Logan Avenue line. The reconstruction will include 3.9 single-track miles. The replacement is with 114-lb. girder rails with special trackwork of the same type and weight. 100-lb. T-rails and 75-lb. A.S.C.E. rails will also be used. All will be laid on twin steel ties spaced 5 ft. 6 in. center to center. All joints are to be welded except on the special track-work. The estimated cost of the reconstruction is $268,000.

International Railway, Buffalo, N. Y., was to start on June 10 the construction of double trackage in Bailey Avenue for a distance of 8,000 ft. Bailey Avenue at this point at present has but a single track and the work, which is estimated to cost about $110,000 and to take two months to complete will include reconstruction of the present single track and the construction of an additional track, making a double trackage for this distance. H. E. Riexinger is the chief engineer in charge of the project. The work will be done by day labor.

The Connecticut Company, New Haven, Conn., is planning to double-track the line on Main Street, in Man-

chester, from the center, south to Locust Street, a distance of some 1,500 ft. The company is asked to provide ten-minute service on this line and is unable to do so with a single track. Business interests of the town feel that the entire street should be double-tracked. N. J. Scott, Manager, of the Hartford Division, has expressed himself in favor of such a plan, but states that it is a matter of expense with his company.

British Columbia Electric Railway, Vancouver, B. C., started work on June 5 on a one-mile double track extension of its Broadway West line. The cost will be about $75,000. Depending upon the consent of the city, permanent track will be laid, 87 lb. rail being used. The new line will provide transportation for a large district and afford a new route for two suburban lines to come into the city, relieving a parallel line. The line is to be in operation by Sept. 1. The construction of this line follows an agreement with the city of Vancouver extending the present 6-cent fare after June 30 when it would have expired. The company is also relaying 1,000 ft. of track on its Kerrisdale line with permanent construction at a cost of $16,000.

Power Houses Shops and Buildings

Tampa (Fla.) Electric Company has purchased a 600 hp. B. & W. boiler.

Trenton & Mercer County Traction Company, Trenton, N. J., will purchase soot blowers.

Shreveport (La.) Railways will build a new carhouse and repair pits to shelter twenty cars.

Texas Electric Railway, Dallas, Tex., has purchased a 400-ton hydraulic wheel press from the Chambersberg Engineering Company of Philadelphia, to supplement a Caldwell press which will be used for lighter work.

Olean, Bradford & Salamanca Railway, Olean, N. Y., expects to build in the near future a brick and steel sash general warehouse and storage building. The company will also purchase equipment for handling hard coal to and from bunker storage for car heaters.

Chicago, Aurora & Elgin Railroad, Aurora, Ill., has been authorized to construct a new freight house to be located on North Broadway. Extensions to the Wheaton carhouse and extensive improvements to the company's power plant are also included in the reorganization plan.

Cumberland County Power & Light Company, Augusta, Me., is planning to spend $1,000,000 for the construction of a new steam station at South Portland and has petitioned the Public Utilities Commission for permission to issue and sell $1,000,000 of its first and refunding mortgage 5 per cent gold bonds for that purpose. This will cover cost of the site, construction and cable connections with the company's existing lines.

Trade Notes

Westinghouse International Company announces that due to its increased business in Argentine it has been necessary to move into larger offices. The new address of the company is Cia. Westinghouse Electric Internacional, S. A., Avenida de Mayo, 1031, Buenos Aires, Argentina. Louis T. Peck is managing director of this branch.

Isidore Newman & Son have announced that the business heretofore conducted by them was incorporated July 1, 1922, and will be continued under the name of Newman, Saunders & Company, Inc. The offices are located at 212 Carondelet Street, New Orleans, La. The firm has long been associated with the financing of utility properties in the South.

Economy Fuse & Manufacturing Company, Chicago, Ill., announces the appointment of Charles H. Bluske as district sales manager of the Los Angeles office at 1304 Maltman Avenue. Mr. Bluske was formerly connected with the Pacific States Electric Company of Los Angeles and succeeds George L. Davis. The Pittsburgh Sales Office of the Economy Fuse & Manufacturing Company has been moved from 2223 Farmers Bank Building to 1006 People's Bank Building, at Fourth Avenue and Wood Street.

National Railway Appliance Company, New York, N. Y., announces that Joseph H. Towle, who joined the selling force of the company some time ago, is now located at Harrisburg, Pa. The company has established an office there to be the Pennsylvania headquarters. Mr. Towle is probably best known to many as master mechanic of the Dayton and Springfield, Ohio, properties of the American Railways. He was later connected with the Railway Improvement Company of New York as sales engineer.

The Barney & Smith Car Company's plant at Dayton, Ohio, which at one time was the largest concern of its kind in the country, will be offered for sale on July 12, according to a court ruling made recently. The plant will be put up at auction by Sheriff Cusick of Montgomery County in compliance with a court order issued in foreclosure of a mortgage held by the stockholders. Valentine Winters, receiver, has announced an organization of Dayton business men will bid on the property.

The Differential Steel Car Company, Findlay, Ohio, reports delivery of eight Differential cars to the Toronto Transportation Commission and a two-car Differential train to the Texas Construction Company. Recent orders for Differential cars include two for the United Electric Railways of Providence, R. I., four for the New Orleans Railway & Light Company, six for the Cleveland Railway Company, two for the Pittsburgh Railways Company. A train of three Differential cars consisting of a motor car and two trail cars has also been ordered by the Community Traction Company, Toledo, Ohio, and the Milwaukee Electric Railway & Light Company has ordered ten Differential cars of the trail type to supplement the equipment they already have in service.

New Advertising Literature

Lourie Manufacturing Company, Springfield, Ill., has issued a leaflet illustrating many of the types of special machines which the company has designed and manufactured for electric railway use.

Joseph Dixon Crucible Company, Jersey City, N. J., has issued a booklet dealing with automobile lubricants. The reasons for the success of Dixon's products are given, and arguments why they should be used in transmissions and differentials.

Martindale Electric Company, Cleveland, Ohio, has issued a folder relating to commutator grinding and undercutting. A card has also been issued giving a scale along the left-hand edge with data regarding commutator troubles, their cause, effect and remedy. Directions for ordering and use of the Imperial commutator stones are given.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has just issued a leaflet entitled "Arc Welding in Electric Railway Shops." The publication describes advantages of arc welding and gives figures showing savings possible by reclaiming railway parts, such as worn and broken brake shoes, side bearings, truck frames, bolsters, door castings, gear cases, air reservoirs, etc.

Carnegie Steel Company, Pittsburgh, Pa., has just issued new editions of its booklets on "Wrought Steel Wheels" and "Industrial Wheels, Gear Blanks and Other Circular Forgings." These booklets give much information of value to electric railways. Dimensions of various types of steel wheels are given, together with tread and flange contours. Standard specifications are also included for solid rolled carbon steel wheels for electric railway service as adopted by the American Society for Testing Materials. The booklet on gear blanks and circular forgings gives dimensions for these parts.

The Conveyors Corporation of America, Chicago, Ill., has issued a new booklet describing its American cast-iron storage tank, which is designed for holding loose, bulky, dry materials for storage or transfer. The tank is sectional and may be secured in a number of sizes. The booklet is illustrated with engravings showing the tanks in use at a number of well-known plants. Diagrams give details of construction and a comprehensive table of weights and measures is included. Copies of the booklet may be secured by addressing the Conveyors Corporation at 326 West Madison Street, Chicago, or on application to the district representatives.